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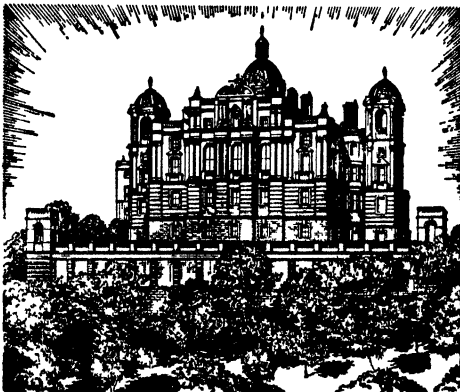
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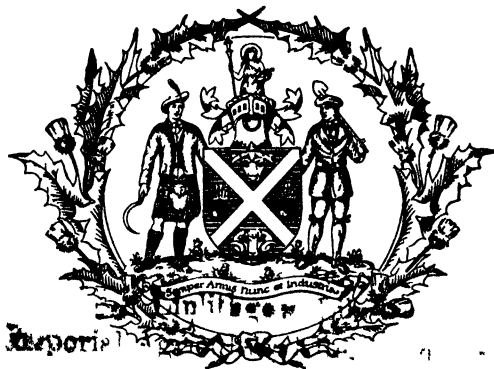
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WITH
AN ABSTRACT OF THE PROCEEDINGS AT BOARD AND GENERAL
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CONTENTS

	PAGE
1. ECONOMIC ASPECTS OF FARM MECHANISATION. By D. WITNEY, B.Com., and H. CHRISTINE M'IVER, B.Sc. (<i>Illustrated</i>)	1
2. FORESTRY: YESTERDAY, TO-DAY, AND TO-MORROW. By Sir GEORGE I. CAMPBELL of Succoth, Bt.	43
3. TUBERCULOSIS ERADICATION. By J. B. DOUGLAS, C.B.E.	59
4. INSECT AND OTHER PESTS OF 1946. By A. E. CAMERON, M.A., D.Sc., F.R.S.E. (<i>Illustrated</i>)	65
5. AGRICULTURAL RESEARCH IN SCOTLAND IN 1946. BEING A BRIEF SUMMARY OF THE WORK AT THE SCOTTISH AGRICULTURAL RESEARCH STATIONS AND AGRICULTURAL AND VETERINARY COLLEGES DURING THE YEAR—	
Institute of Animal Genetics	89
Animal Diseases Research Association	90
The Rowett Research Institute	90
Scottish Plant-Breeding Station	92
The Hannah Dairy Research Institute	94
The Macaulay Institute for Soil Research	97
Edinburgh and East of Scotland College of Agriculture	101
The North of Scotland College of Agriculture	104
The West of Scotland Agricultural College—	
Milk Utilisation Department	107
Animal Husbandry Department	109
Royal (Dick) Veterinary College	112
6. MILK RECORDS. By JAMES A. PATERSON	114
7. ANALYSES FOR MEMBERS DURING THE FIRST FIVE MONTHS OF 1946. By MARSHALL J. ROBB, B.Sc., F.R.I.C., and JOHN E. RITCHIE, M.A., B.Sc., F.R.I.C.	125

8. THE CEREAL AND OTHER CROPS OF SCOTLAND FOR 1946	127
9. THE WEATHER OF SCOTLAND IN 1946. By W. A. HARWOOD, D.Sc., F.R.S.E.	150
Rainfall (Measured in Inches) for 1946	160
10. AGRICULTURAL STATISTICS	161
11. PRICES OF GRAIN IN EDINBURGH MARKET FOR 1946	168
12. PRICES OF SHEEP SINCE 1818	169
13. PRICE OF WOOL SINCE 1818	173
14. PREMIUMS AWARDED BY THE SOCIETY, 1946	176
15. ACCOUNTS OF THE SOCIETY FOR 1945-46	178
16. PROCEEDINGS AT SOCIETY'S BOARD AND GENERAL MEETINGS	185

APPENDIX.

PREMIUM BOOK FOR 1947, CONTAINING PARTICULARS OF CON- STITUTION, EDUCATIONAL AND SCIENTIFIC DEPARTMENTS, AND PREMIUMS OFFERED IN 1947	1
MEMBERS ADMITTED JANUARY AND JUNE 1947	91

INDEX	<i>At end</i>
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* * *It is to be distinctly understood that the Society is not responsible for the views, statements, or opinions of any of the Writers whose Papers are published in the 'Transactions.'*

JOHN STIRTON,
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ILLUSTRATIONS

FIG.	PAGE
1. Three self-propelled, 12-foot cut, Massey-Harris tank combines at work in a field of barley	3
2. International Harvester Co.'s automatic twine-tying pick-up baler	3
3. Seasonal distribution of work done by tractors, 1944-45	12
4. Seasonal distribution of work done by tractors, 1945-46	13
5. Composition of Tractor Costs, 1945-46	24
6. Comparative Tractor Costs	25
7. Distribution of Combine Harvesters in E. and S.E. Scotland, 1945	29
8. A self propelled, 8-foot cut, Massey-Harris tank combine cutting wheat	36
9. A steel, self-emptying grain-hopper, made on a West Linton farm, and holding 30-40 cwt. of grain, emptying in 60 seconds	36
10. Stages of the life-cycle of <i>Culicoides impunctatus</i> . Female, Head of Female, Eggs, Larva, and Pupa	70
11. Edinburgh Midge Box Trap	71
12. <i>Chlorops pumilionis</i> . Gout Fly	79
13. <i>Oscinella frit</i> . Frit Fly	81
14. <i>Plutella maculipennis</i> . Diamond-Back Moth	83
15. <i>Hylecætus dermestoides</i> . A polyphagous wood-boring beetle.	86

TRANSACTIONS
OF
THE HIGHLAND AND AGRICULTURAL
SOCIETY OF SCOTLAND
— —
ECONOMIC ASPECTS OF FARM MECHANISATION.

By D. WITNEY, B Com , and H CHRISTINE M'IVER, B.Sc.,
Edinburgh and East of Scotland College of Agriculture (Dept. of Economics).

INTRODUCTORY.

FARM mechanisation is of ever-increasing importance in present day agriculture. Even before the war Scottish farms were gradually becoming more and more mechanised ; this tendency gained much impetus under the stress of war conditions.

Tractor design had improved greatly before the war started, and by 1939 many farmers in the east and south-east of Scotland had already replaced some of the horses on their farms by tractors. The ploughing-up of large acreages of grassland which began in 1940, and the increased profits derived from farming in war-time, led many farmers to purchase more tractors and tractor-drawn implements. Until 1943 the acreage under the plough continued to increase and farming reached the peak of its war-time prosperity in 1942-43 or 1943-44. As might be expected, the numbers of tractors in Scotland increased greatly during this period, while the numbers of horses on farms slowly declined.

Indeed, having regard to the increasing labour shortage, it would have been impossible, without the aid of mechanisation, to grow the unusually large acreages of crops required to meet the nation's need. Since the war ended, the reduction of the Women's Land Army and the repatriation of prisoners of war has rendered the labour shortage still more acute, and it remains a matter of vital importance that the acreage of land under cropping shall be kept as high as possible. Farm mechanisation, by affording an opportunity of raising the output of manual labour, offers possibly

the best solution to the problem of maintaining a high level of production with the reduced supply of labour available.

The following table illustrates the contrast between the increasing number of tractors in Scotland, both during and since the war, and the declining number of horses employed in agricultural work. In 1939, as these figures show, horses in Scotland outnumbered tractors by twenty-three to one; to-day the proportion is but five to one, whilst the modern tractor is increasingly efficient.

TABLE I.

AGRICULTURAL STATISTICS FOR SCOTLAND, 1939-1946.

	1939	1940	1941	1942	1943	1944	1945	1946
Tillage area of crops and bare fallow (1000 acres) . . .	1,481	1,664	1,924	2,097	2,120	2,114	2,011	1,953
Percentage increase over 1939 . . .		12 ⁰ / ₁₀₀	30 ⁰ / ₁₀₀	42 ⁰ / ₁₀₀	43 ⁰ / ₁₀₀	43 ⁰ / ₁₀₀	36 ⁰ / ₁₀₀	32 ⁰ / ₁₀₀
Total horses . . .	141,561	139,427	138,171	133,535	126,764	121,166	117,007	112,000
Tractors . . .	6,250	9,218	12,017	15,334	19,124	20,518	*	23,576
Proportion of horses to tractors . . .	23.1	15.1	11.1	9.1	7.1	6.1	*	5.1

* Not available

† February 1946.

Combine harvesters are a comparatively recent innovation in Scotland. Before the war there were only 2 in the whole of the east and south-east of Scotland; even by 1943 their numbers in that area had only increased to 32. In 1944 the number suddenly rose in the area to 121. In 1945 there were 151 and, including the other 19 machines in the north and west of Scotland, there were 170 combines working in the whole country. In the wet harvest of 1944 combines proved their worth in face of much adverse criticism, and since then the numbers have steadily increased. During the prolonged wet weather of the 1946 harvest, combine harvesters were the means of securing hundreds of acres of grain in good condition, which otherwise would have been either completely lost to the nation, or, at the best, obtained in a very damaged condition after Herculean efforts on the part of the farmer and his men.

TRACTORS IN EAST AND SOUTH-EAST SCOTLAND.

In view of the desirability of obtaining authoritative and up-to-date data on the economics of tractors, particularly in the arable areas of eastern Scotland, a Tractor Costs Investigation was inaugurated in February 1944 by the Edinburgh and East of Scotland



Fig 1 *Three self propelled 12 foot cut Massey Harris tank engines at work in a field of barley*

(Photograph kindly lent by J. Rutherford & Sons, Home Plac. Coldstream)



Fig 2 *International Harvester Co.'s automatic turner tying pick-up bales*

(Photograph kindly lent by the National Institute of Agricultural Engineering,
Askham Bryan, York)

College of Agriculture, and, with the assistance of interested farmers, completed records covering a whole year's tractor operations were made available for 164 tractors on 86 farms.¹ Certain other information was collected regarding these farms at the commencement of the investigation and brought up to date in February 1945, from which the figures and tables given below have all been derived.

Before we proceed to deal with the costs and performance of farm tractors, it is desirable that we should give briefly a general picture of the size and organisation of the farms studied. Excluding rough grazing, only 1 of these 86 farms is under 100 acres in extent, viz., a 98½-acre farm situated in East Perth. The largest farm, or farm group, which is also in East Perth, covers 1622½ acres. The average size of these 86 farms is 428½ acres; 28 of the farms are between 100 and 300 acres, 34 between 300 and 500 acres, and 13 between 500 and 700 acres, while the remaining 10 farms are larger still.

Table II. shows how the average farm cropping (excluding all land merely used for grazing) was made up in 1944, and the percentage of the total crop acreage of the 86 farms covered by each crop.

TABLE II.

LAND UTILISATION OF 86 FARMS STUDIED.

Crop						Per Farm	Per 100 Acres
Wheat	.	.	.	.	.	45	16
Barley	.	.	.	.	.	45	16
Oats	.	.	.	.	.	60	21
Other Grain	.	.	.	.	.	3	1
ALL GRAIN	.	.	.	.	.	153	54
Potatoes	.	.	.	.	.	40	14
Sugar Beet	.	.	.	.	.	5	2
Turnips and Swedes	.	.	.	.	.	37	13
Kale, Rape, &c.	.	.	.	.	.	8	3
Hay	.	.	.	.	.	34	12
Other Crops	.	.	.	.	.	6	2
TOTAL	.	.	.	.	.	283	100

Grain crops covered 54 per cent of the land, oats occupying the largest acreage—viz., about one-fifth (21 per cent) of the total. Potatoes, the main green crop, also figured prominently and were grown on 14 per cent of the cropped land; in importance they

¹ A report thereon viz. 'Report No. 1 (duplicated) 1944-45 Tractor Costs and Performance' (June 1945) was prepared and circulated, but is now out of print. A further report is in preparation.

were closely followed by turnips and swedes with 13 per cent of the land. One very large farm had as much as 305 acres of potatoes. Hay, the only crop to be grown on every farm, covered 12 per cent of the cropped land. Smaller acreages of sugar beet, rye, beans, mashlum, mangolds, rape, kale, and cabbages also were grown.

CAPITAL OUTLAY.

Table III. gives the capital invested per farm in each type of tractor, with corresponding figures for 100 acres of crop, excluding all grass except hay; these sums are also expressed as a percentage of the total capital invested in tractors.

TABLE III.

CAPITAL INVESTMENT IN TRACTORS.

Type of Tractors	No. of Tractors studied	Average Investment per Farm (£28½ acres)*			Average Investment per 100 acres of Crop, excluding grass			Per cent of total Capital invested in each type of Tractor
		£	s	d	£	s	d	%
Light Tractors	41	154	13	11	54	12	4	20.0
Medium Tractors	113	339	19	4	120	0	7	44.1
Heavy Tractors	20	91	14	0	32	7	6	11.9
Track laying Tractors	24	184	17	8	65	5	6	24.0
TOTAL	198	£771	4	11	£272	5	11	100.0

* Excluding mountain and heath land

The average capital invested in tractors at 1st February 1945 on a farm with 128½ acres of crops and grass was £771, equal to £272 per 100 acres of crops, excluding grass. The medium wheeled tractors, notwithstanding their popularity and consequent preponderance in the group figures listed above, represented only 44 per cent of the capital invested in tractors because of the low initial cost of the many Fordsons included therein. The 24 track-laying tractors present a complete contrast. Most farmers were very favourably impressed with track-laying tractors, but in many cases considered that their farms were either not so steep as to require a track-laying tractor, or that the land was too poor to warrant the high initial cost of such a machine. Heavy wheeled tractors were apparently the least popular type, though they proved highly satisfactory to their owners, and, on the average, they were kept more fully employed than the other types of tractors.

To provide a set of implements suited to the variable seasonal requirements of these intensive arable farms involves the outlay

of a considerable sum of money. To give some indication of the amount of this, all the tractor-drawn implements on the 86 farms studied have been grouped according to their similarity of type or purpose. Table IV. shows the capital invested in each group of tractor-drawn implements.

TABLE IV.

CAPITAL INVESTMENT IN TRACTOR-DRAWN IMPLEMENTS.*

Implements	Average Investment per Farm (428½ acres †)			Average Investment per 100 acres of crop, excluding grass			Per cent of Total Capital invested in each group of implements
	£	s	d	£	s	d	
1 Ploughs	92	6	6	32	11	11	13.5
2 Cultivating implements, harrows, cultivators, ridgers, discs, rollers, and tool bars	184	14	9	65	4	5	27.3
3 Grain drills and manure distributors	52	6	1	18	9	4	7.7
4 Mowers and trailer binders	62	9	6	22	1	2	9.1
5 Power drive binders	100	5	7	35	8	1	14.8
6 Potato diggers	14	14	5	15	15	9	6.6
7 Trailers	104	16	6	37	0	3	15.4
8 Miscellaneous implements (e.g., hay sweeps and sprayers)	38	0	8	13	8	7	5.8
TOTAL	£679	14	0	£239	19	6	100

* Includes both new and second hand implements, whether especially made for the tractor, or horse adapted implements.

† Excluding mountain and heath land.

The average investment in tractor-drawn implements, excluding the tractors themselves, amounts to practically £680 per farm—i.e., £240 per 100 acres of land under crop. Of these sums fully 40 per cent—i.e., two-fifths—was spent on ploughs and cultivating implements, an indication of the large amount of ploughing and cultivating done by tractors. An average of £100 per farm was invested in power-drive binders and over £100 per farm was spent on trailers. Considering the high proportion of tractor-time occupied in haulage, the latter figure is not unexpectedly high.

Adding these sums to those given in the preceding paragraphs, we see that the total invested in tractors and tractor-drawn implements is £1451 per farm of 428½ acres—i.e., £512 per 100 acres under crops, excluding grass.

The two following tables give some indication of the nature and scale of the outlay on the 86 farms on tractors and tractor-drawn implements during the ten years 1935-1944 inclusive. Covering a period which has witnessed such revolutionary changes in farm technique, these tables should repay careful study, so only their salient features require to be touched upon.

TABLE V.—TEN YEARS' CAPITAL OUTLAY ON TRACTORS AND TRACTOR-DRAWN IMPLEMENTS
(*i.e.*, proportion of Capital invested in Tractors and Tractor-drawn Implements from 1935 (or earlier) to 1944).

TRACTORS or earlier	1935		1936		1937		1938		1939		1940		1941		1942		1943		1944		Total	Total Capital invested in each type of Tractor and Implement on 86 Farms	Per cent of Total Capital invested in each type of Tractor and Implement
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				£	o/o
Light Tractors	13,304	20.0	
Medium Tractors	7	7	5	3	3	7	10	9	9	21	21	14	12	10	100	100	100	100	100	29,237	44.1		
Heavy Tractors	..	..	3	14	..	8	10	10	10	22	27	..	..	6	100	100	100	100	100	7,886	11.9
Track-laying Tractors	..	..	..	..	..	3	7	18	18	30	30	26	26	9	7	100	100	100	100	15,900	24.0
ALL TRACTORS	3	3	3	4	4	5	8	13	22	22	21	13	8	100	100	100	100	100	100	£66,327	100		
TRACTOR-DRAWN IMPLE- MENTS—																							
Ploughs—1-furrow	8	..	..	..	..	6	8	16	16	7	18	27	10	100	100	100	100	100	100	592	1.0
" 2-furrow	4	4	6	..	..	7	15	11	11	8	27	12	6	100	100	100	100	100	100	5,045	8.6
" 3-furrow	..	6	3	..	..	5	3	8	8	22	20	16	17	100	100	100	100	100	100	1,425	2.4
" 4-furrow	12	..	..	..	..	7	7	12	12	15	19	8	20	100	100	100	100	100	100	878	1.5
Heavy Harrows	26	3	3	3	5	5	5	12	12	5	15	10	16	100	100	100	100	100	100	1,502	2.6		
Light Harrows	52	..	..	..	..	..	5	1	1	9	5	17	9	100	100	100	100	100	100	514	.9
Cultivators	12	6	7	..	..	9	9	15	15	6	19	15	2	100	100	100	100	100	100	2,607	4.5
Ridgers	..	..	..	..	..	10	7	16	16	22	19	13	13	100	100	100	100	100	100	1,050	1.8
Rollers	22	..	4	4	4	10	4	5	5	9	20	12	14	100	100	100	100	100	100	2,704	4.6		
Discs	7	..	4	4	7	10	10	16	16	13	18	14	11	100	100	100	100	100	100	3,256	5.6		
Grain Drills	12	2	..	..	..	7	10	7	7	9	24	17	19	100	100	100	100	100	100	3,044	5.2
Manure Distributors	15	..	4	3	8	10	8	7	7	10	13	21	19	100	100	100	100	100	100	1,454	2.5		
Mowers	15	4	3	8	10	9	14	9	9	14	20	10	7	100	100	100	100	100	100	2,365	4.0		
Hay Sweeps	8	8	2	..	6	12	6	12	12	15	16	21	17	100	100	100	100	100	100	481	.8		
Power-drive Binders	4	3	2	..	3	5	5	9	9	16	19	22	17	100	100	100	100	100	100	8,624	14.8		
Trailer Binders	19	8	2	13	8	6	12	6	6	12	15	17	..	100	100	100	100	100	100	3,008	5.1		
Potato-diggers	11	2	..	3	3	12	18	12	12	18	18	19	14	100	100	100	100	100	100	3,846	6.6		
Trailers	..	4	1	2	5	6	6	16	16	11	25	20	10	100	100	100	100	100	100	9,015	15.4		
Tool-bars	1	1	3	6	11	10	29	21	21	14	4	26	12	100	100	100	100	100	100	4,254	7.3		
Miscellaneous Imple- ments	36	..	1	2	..	2	10	1	2	10	1	22	26	100	100	100	100	100	100	2,790	4.8		
ALL IMPLEMENTS	10	2	3	6	7	11	13	19	17	12	100	100	100	100	100	100	100	100	100	£58,454	100		

From Table V. it will be seen that these 86 farms had on hand on 1st February 1945 tractors to the value of £66,327 and tractor-drawn implements to the value of £58,454, almost the whole of which sums had been laid out during the preceding ten years. How great a proportion of this sum had been spent as a result of the urgency of the war-time food production campaign will be readily seen from an examination of the figures relating to each year set out as percentages of the total outlay on each class of implement over the whole period. The last five pre-war years (1935-1939) and the first five war years (1940-1944) form an effective contrast. Of the total outlay on tractors alone, 23 per cent was invested in the first period and 77 per cent in the latter; in the case of tractor-drawn implements the corresponding figures were 28 and 72 per cent respectively. The average outlay on tractors and tractor-drawn implements together was over three times as heavy during 1940 to 1944 as it had been during the previous five-year period. In view of the war-time labour shortage, there was a keen demand for any implement which would eke out labour.

The outlay on tractors reached its peak in 1941, and on tractor-drawn implements in 1942—*i.e.*, shortly after the introduction of Lend-Lease arrangements with U.S.A. Although these arrangements remained in operation until August 1945, most farms were largely mechanised before that time, and this fact, coupled with dwindling farm profits, largely accounted for the diminished outlay on tractors and tractor-drawn implements in 1943 and 1944.

Right up to 1943 inclusive there was a heavy demand for ploughs and implements of cultivation generally; but in 1944 there was a noticeable tendency to acquire implements which would employ the full available power of the tractors—larger implements, wider grain drills and sets of harrows were being purchased. It is worthy of comment also that in 1941, when the Potato Acreage Payment (£10 an acre) was introduced, increased sums were invested in ridgers, tool-bars, and potato-diggers; whilst the commencement of the Wheat and Rye Acreage Payments (£3 an acre) in 1943 was accompanied by increased expenditure on power-drive and trailer binders.

Before leaving Table V., it may be seen from the last column in the table, that medium tractors, first to attract much attention from farmers, still hold pride of place, although both light and track-laying tractors have come more into prominence during the war years. Amongst tractor-drawn implements, most money on these farms is now locked up in trailers and costly power-drive binders—both recently much in demand—which are closely followed by ploughs, in which there is a decided preference for two-furrow ploughs.

Table VI. examines the same data from another angle and shows the capital invested per 100 acres of crop, excluding grass, the figures being set out in £'s and decimals of £1. For the sake of simplicity, tractor-drawn implements have been grouped into broad categories. From the extreme right-hand column it will be seen that, in terms of £ s. d., the capital invested in tractors amounts

TABLE VI.—TEN YEARS' CAPITAL OUTLAY ON TRACTORS AND TRACTOR-DRAWN IMPLEMENTS
PER 100 ACRES CROP, EXCLUDING GRASS

(i.e., Capital invested per 100 acres Crop, excluding Grass, in Tractors and Tractor-drawn Implements from 1935 (or earlier) to 1944).

IMPLEMENTS	1935 or earlier	1936	1937	1938	1939	1940	1941	1942	1943	1944	Total
	£	£	£	£	£	£	£	£	£	£	£
Light Tractors . . . . .	..	..	1 0	..	3 4	8 2	9 0	13 9	15 6	3 5	54 6
Medium Tractors	8 6	6 4	5 9	8 5	11 6	10 7	24 4	17 1	14 6	12 2	120 0
Heavy Tractors . . . . .	..	1 0	4 4	2 6	3 1	3 3	7 3	8 9	..	1 8	32 4
Track-laying Tractors . . . . .	..	..	..	1 9	5 0	11 8	19 4	17 0	5 8	4 4	65 3
ALL TRACTORS	£8 6	£7 4	£11 3	£13 0	£23 1	£34 0	£60 1	£56 9	£36 0	£21 9	£272 3
Ploughs	1 4	1 2	1 4	2 1	3 6	3 7	3 7	7 9	4 4	3 2	32 6
Cultivating implements, harrows, cultivators, rollers, ridgers, discs, and tool-bars	7 5	1 1	2 3	4 8	5 5	7 5	10 0	12 1	8 8	5 6	65 2
Grain drills and manure distributors	2 4	2	2	2 2	1 8	1 3	1 7	3 8	3 4	3 5	18 5
Mowers and trailer binders	3 8	1 3	6	2 4	2 0	1 7	2 8	3 7	3 1	7	22 1
Power-drive binders	1 5	9	8	1 0	1 8	3 0	5 8	6 6	7 8	6 2	36 4
Potato-diggers	1 7	3	..	5	5	1 9	2 9	2 8	2 9	2 3	15 8
Trailers	1 4	4	7	1 9	2 1	6 1	4 0	9 2	7 4	3 8	37 0
Miscellaneous implements—e.g., hay sweeps and sprayers	4 2	2	1	2	1	5	1 4	5	2 8	3 4	13 4
ALL IMPLEMENTS	£23 9	£5 6	£6 1	£13 1	£17 4	£25 7	£32 3	£46 6	£40 6	£28 7	£240 0
TOTAL CAPITAL INVESTED IN TRACTORS AND TRACTOR-DRAWN IMPLEMENTS	£32 5	£13 0	£17 4	£26 1	£40 5	£59 7	£92 4	£103 5	£76 6	£50 6	£512 3

TABLE VII.—GEOGRAPHICAL DISTRIBUTION OF RECORDED TRACTORS.

1944-45										1945-46				
	ALL TRACTORS	WHEELED TRACTORS			TRACK LAYING TRACTORS	ALL TRACTORS	WHEELED TRACTORS			TRACK- LAYING TRACTORS				
		Light	Medium	Heavy			Light	Medium	Heavy					
Angus	17	4	10	1	2	4	..	3	..	1				
East Perth	22	4	13	4	1	7	..	3	3	1				
Clackmannan and Kinross	3	3	..	..	..	..	..	..	..	..
Fife	37	4	21	7	5	13	2	7	2	2				
East Lothian	28	5	16	2	5	6	..	4	..	2				
Midlothian	8	2	6	..	..	..	..	..	..	..
West Lothian	4	2	1	1	..	..	..	..	..	..
Berwick	21	2	12	1	6	17	2	11	..	4				
Roxburgh	13	4	8	1	..	1	..	1	..	..		
Peebles	6	3	3	..	..	2	2	..	..	..	
Selkirk	5	1	4	..	..	5	1	3	..	1		
TOTAL	164	34	94	17	19	55	7	32	5	11				

to £272, 6s. per 100 acres of crops, excluding grass, and that in tractor-drawn implements £240, making £512, 6s. in all. The annual outlay over the past ten years, set out clearly in the table, requires no further comment.

SAMPLE OF TRACTORS COSTED.

In the 1944-45 Tractor Costs Investigation completed records covering a whole year were obtained for 164 tractors. The investigation was continued on a smaller scale in the following year, records covering the year being completed for 55 tractors. Tables VII.-XIV. were all based on these records.

The tractors were divided into four groups—light, medium, and heavy wheeled tractors and track-laying tractors. Drawbar horse power was the main index used in classifying the wheeled tractors. David Brown and Ford Ferguson tractors were considered to be light tractors, Fordsons were classified as medium tractors, while Case D.C.4 and International Farmall M tractors were put in the heavy group.

Table VII. shows the geographical distribution of the recorded tractors, and the numbers in each group in 1944-45 and 1945-46.

In 1944-45 Fife was the county most strongly represented in our sample, followed by East Lothian, East Perth, and Berwickshire. In 1945-46 the largest number studied were situated in Berwickshire, with Fife next in order of importance.

During both years the medium wheeled group was easily the largest, more than half the tractors being of that type. This was mainly due to the large proportion of Fordson wheeled tractors recorded—viz., 58 in the first year and 22 in the second year. In each year the track-laying group was well represented, nearly half of these track-layers being Caterpillar D.2's.

Table VIII. gives the average number of hours worked per tractor per annum, and the range for each group during both years.

TABLE VIII.
HOURS WORKED PER TRACTOR PER ANNUM.

	WHEELED TRACTORS			TRACK LAYING TRACTORS
	Light	Medium	Heavy	
1944-45				
Average hours .	1151½	1035	1215	1058
Range of hours	247-1812	236-1867	621-2142	560-1711
1945-46				
Average hours .	1195½	1059	1345½	1180
Range of hours	646-1863	476-1853	533-1782	700-1783

In both years the average number of hours worked per tractor in each group was over 1000, but in 1945-46 the average was higher in every case than in 1944-45. The average number of hours worked by tractors in each group during both years varied between very wide limits, although as might be expected, with the smaller sample of tractors recorded in the second year, the variations were not so great as in the first year. During both years the heavy wheeled tractors worked the biggest number of hours and the medium tractors the smallest.

JOBS UNDERTAKEN BY TRACTORS.

Two block graphs—viz., Figs. 3 and 4—illustrate the seasonal

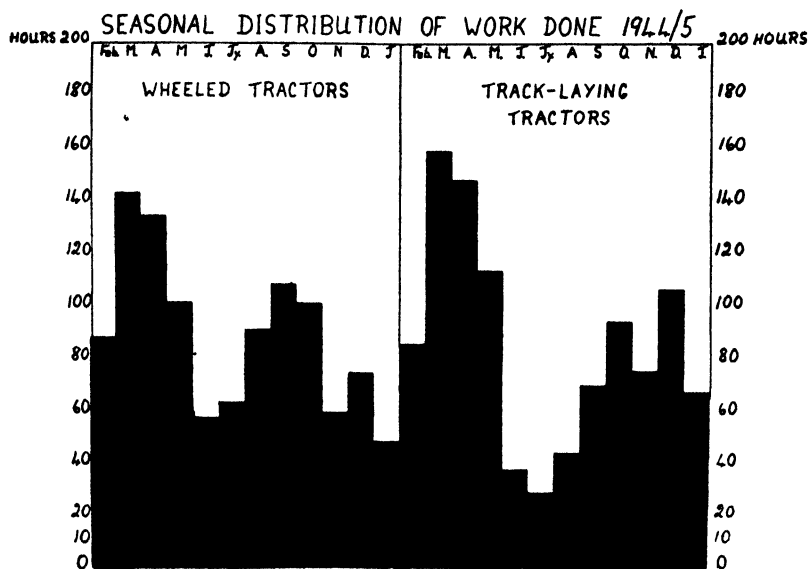


Fig 3

distribution of the average number of hours worked by all the tractors listed in Table VII. during 1944-45 and 1945-46; each operating year commenced in February, when the investigation started, and ended the following January.

It will be seen that both the wheeled and track-laying tractors were in most constant use for the spring cultivations in both 1944-45 and 1945-46. The peak was reached in March, April, and May during the first year when the winter had been mild and open; but in the second year, after a harder winter with a particularly inclement January, the peak period was earlier, from February to April. The weather in 1944 was most unusual, while in 1945 it was normal. The wet harvest of 1944 necessitated longer working hours,

more particularly for the wheeled tractors, than in the better harvest of 1945. Due to this, the autumn peak of work, although much less pronounced than the spring peak in both years, was higher in 1944 than in 1945. The better autumn and early winter weather in 1945-46 enabled much more ploughing to be done than in 1944-45; hence the very pronounced peak in the work done by the track-layers in the early months of 1945. The comparatively slack periods during both years were the summer months of June and July when there was little work to be done, and in late December and January when nothing but essential haulage and belt-work could be done.

The wide range of operations now undertaken by tractors—including the clearing of snow from farm roads—effectively demon-

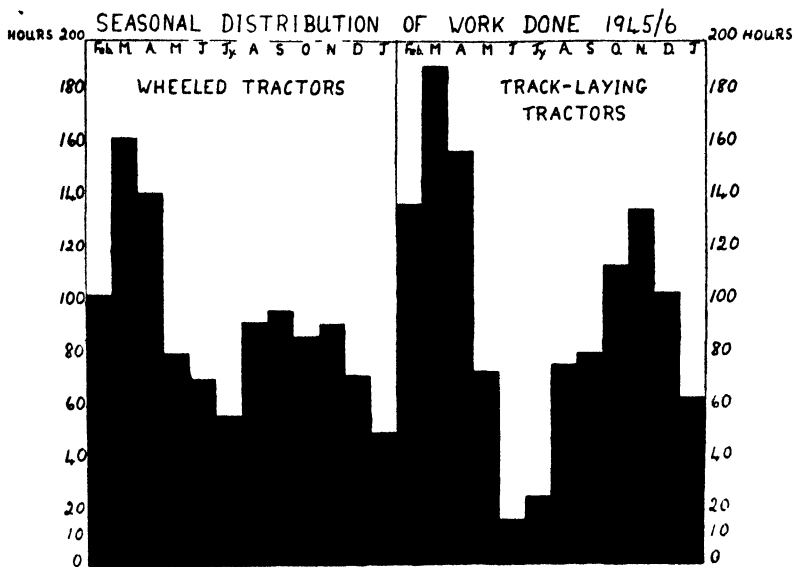


Fig 4

strates their versatility and indispensability. Table IX. shows the average number of hours worked, and the percentage of the total hours spent doing different jobs by each group of tractors during both years. All tractors did some belt-work, which included threshing, bruising, and sawing wood, but only the heavy wheeled tractors and the track-laying tractors did much of it, as the other types of tractors were not powerful enough to be very satisfactory. In the case of the light wheeled tractors haulage accounted for approximately two-fifths of their working hours in both years. The other wheeled tractors were employed in haulage work for approximately one-third of their time in 1944-45, but in 1945-46 this decreased to about one-quarter. Track-laying tractors under-

TABLE IX.—JOBS DONE.

Jobs Done	1944-45										1945-46									
	Average No. of Hours Worked					Do. as % of the Yearly Total					Average No. of Hours Worked					Do. as % of the Yearly Total				
	Wheeled Tractors					Track-laying Tractors					Wheeled Tractors					Track-laying Tractors				
	Light	Medium	Heavy	Hours	%	Light	Medium	Heavy	Hours	%	Light	Medium	Heavy	Hours	%	Light	Medium	Heavy	Hours	%
1. Belt-work	21½	69	110½	37	31	0	9	0	31	0	1	20½	43	79½	39	0	2	3	7	0
2. Haulage	45½	33½	397½	127	12	33	33	33	157½	13	46	253½	364	157½	13	38	24	27	13½	13
3. Ploughing—1-furrow	23½	20	71	72½	1	1	1	1	93½	1	41½	74	173½	97	3½	24½	1	13	8½	8½
4. " 2-furrow	131	165	151½	148	14	16	12½	14	86	14	291½	414	201½	270½	24½	4	26½	64	17	17
5. " 3-furrow			94	140	1	1	1	1	201½	1				40½	1		4	23	23	23
6. " 4-furrow			25	42	4	2	2	4	34	4				46½	1½		44	4	4	4
7. Discing	3	33	25	42	3	3	3	3	29	3	17	47	1	51	4	1	2	2	4	4
8. Harrowing	5	56	36	59½	5	31	31	31	14	5	48	24	29	103	1	4	5	1	1	1
9. Rolling	18½	15	201	14	14	1	1	1	13½	14	6½	24½	13½	18½	1	1	2	1	1	1
10. Drilling Seeds	12½	13½	25	19½	1	1	1	1	22½	1	22½	14½	13½	2	1	1	1	1	1	1
11. Sowing Manure	25½	11	50½	49	1	4	4	4	91	1	91	91	50½	38	1	5	5	6½	3½	3½
12. Cultivating	22½	43	34½	50½	4	3	3	3	16	4	61½	33½	23½	23	1	3	24	2	24	24
13. Grubbing	29	32½	65½	80	1	3	3	3	112	1	60½	31	24	28½	1	5	8	8	24	24
14. Ridging	7½	11	4½	6	1	1	1	1	24	1	11	24	24	17½	1	1	1	1	11½	11½
15. Spring-tooth Harrowing Two cultivations in tandem—	2	11	4½	6	1	1	1	1	24	1	11	24	24	17½	1	1	1	1	11½	11½
16. Harrowing and Rolling	11	21	21	2	1	1	1	1	14	1	6	13½	14	13½	1	1	1	1	1	1
17. Harrowing and Discing		14		38	34				9	34	1	14	9	13½	1					
18. Harrowing and Cultivating	3																			
19. Spraying Potatoes	16½	41	3	13½	11	11	11	11	50½	11	34	14	50½	12	1			4	1	1
20. Sweeping Hay	11	1							19½		91	11	19½	24	1	1	1	11		
21. Mowing Hay	21½	19½	48	7	1	2	4	4	27½	1	21½	15½	27½	19	2	1	1	2	11½	11½
22. Cutting grain with—																				
Power-drive Binder	40½	49½	69½	55½	3½	3½	6	6	43	3½	74	24	43	21	1	1	2	8	2	2
23. Trailer Binder	41	34½	28½	13½	1	34	34	34	44½	1	34½	53	44½	42	3	3	3	3	3	3
24. Digging Potatoes	59½	60	21	21	3	3	3	3	87½	3	444	51	87½	47	31	31	31	64	31	31
25. Miscellaneous	61	31½	31½	59½	3½	2	2	2	154	3½	21	24	154	47½	2	2	2	11½	11½	11½
TOTAL	1151½	1035	1215	1058	100	100	100	100	1343½	100	11954	1039	1343½	1180	100	100	100	100	100	100

took a more limited proportion of haulage work, mainly on steep land where wheeled tractors would have been of little value.

Ploughing bulked largely in the working time spent by all tractors, but they spent considerably less time on this job in 1944-45 than in 1945-46, due to the abnormal weather conditions in the earlier year. Usually, the wheeled tractors undertook 2-furrow ploughing, although in 1945-46 the heavy wheeled tractors did an appreciable amount of deep single-furrow ploughing and 3-furrow ploughing. The track-layers, as might be expected, spent a very large proportion of their time in ploughing, usually with either 3-furrow or 4-furrow ploughs.

Almost all tractors tackled a wide variety of such jobs as discing, harrowing, rolling, drilling seeds, sowing manure, cultivating, grubbing, and ridging during both years, besides mowing hay, and cutting grain with either a trailer binder or a power-drive binder. Some farmers are using their tractors to an increasing extent for pulling two or more implements in tandem—*e.g.*, harrows and rollers. Figures are shown for the three most frequently performed tandem operations; some track-laying tractors pulled three implements at the same time.

The miscellaneous jobs which occupied a small portion of the total hours worked included robot potato planting in one case, and a good deal of tandem work.

FUEL CONSUMPTION.

Economic fuel consumption is a matter of prime importance in tractor operation, and Table X. gives the average fuel consumption per hour for each type of job undertaken both in 1944-45 and 1945-46; alongside each job is indicated the number of tractors for which full particulars were recorded.

Although there is a great variation in the fuel consumption per hour amongst the individual tractors within each group, during both years the light tractors used the smallest amount of fuel per hour worked, while the medium tractors used most. The fuel consumption shown for the track-laying tractors (which is lower than that for the heavy tractors) is perhaps somewhat misleading, as 12 of the 19 track-layers recorded in 1944-45 and 7 of the 11 recorded in 1945-46 ran on diesel oil instead of T.V.O., which was used by all the other tractors. The track-layers burning diesel had a much lower fuel consumption per hour than those burning T.V.O., .865 and .847 gallons per hour of diesel, as compared with 1.158 and 1.164 gallons per hour of T.V.O. Due to this, fuel consumption per hour of the track-laying tractors varies more for different jobs than that of the wheeled tractors. As might be expected the tractors use less fuel for light jobs like haulage than for heavy jobs such as ploughing. Individual tractors vary very much in their fuel consumption per hour.

TABLE X.—AVERAGE FUEL CONSUMPTION PER HOUR.

JOBS DONE	1944-45										1945-46									
	WHEELED TRACTORS					TRACK-LAYING TRACTORS					WHEELED TRACTORS					TRACK-LAYING TRACTORS				
	Light	Medium	Heavy	No re-corded	Galls	Light	Medium	Heavy	No re-corded	Galls	Light	Medium	Heavy	No re-corded	Galls	Light	Medium	Heavy	No re-corded	Galls
Yearly average . . .	34	763	94	1 044	17	975	19	970	6	955	7	735	32	1 115	5	981	11	944	2	981
1. Belt-work . . .	7	833	48	1 109	15	1 142	6	955	6	955	1	923	12	1 079	4	1 184	2	981	2	981
2. Haulage . . .	34	660	79	943	16	788	18	749	18	749	7	625	20	915	4	818	6	729	6	729
3. Ploughing—1-furrow . . .	9	852	5	1 113	3	1 046	2	1 076	2	1 076	1	798	2	1 050	3	943	5	958	5	958
4. " 2-furrow . . .	29	869	82	1 157	14	1 154	6	968	10	968	6	815	27	1 217	2	1 147	7	1 010	7	1 010
5. " 3-furrow . . .	..	..	11	1 071	1	1 543	10	1 005	10	1 005	..	..	5	1 236	2	1 245	7	991	7	991
6. " 4-furrow . . .	..	..	1	1 492	1	1 788	9	932	9	932	..	..	..	..	..	1 245	7	991	7	991
7. Discing . . .	19	884	53	1 273	9	1 152	9	1 092	9	1 092	4	910	21	1 201	1	1 263	6	1 015	6	1 015
8. Harrowing . . .	30	844	84	1 152	13	1 066	17	1 076	17	1 076	7	834	30	1 257	5	1 250	9	1 038	9	1 038
9. Rolling . . .	18	788	36	1 172	10	1 062	9	1 098	9	1 098	4	807	22	1 137	3	1 302	6	1 013	6	1 013
10. Drilling Seeds . . .	11	825	30	1 048	7	1 131	3	1 342	3	1 342	2	735	11	1 038	2	1 101	6	1 005	6	1 005
11. Sowing Manure . . .	14	732	32	1 052	4	965	3	691	3	691	2	689	10	1 043	..	1 146	9	1 228	9	1 228
12. Cultivating . . .	25	905	59	1 166	9	1 167	15	1 038	15	1 038	6	895	20	1 185	3	1 146	9	1 228	9	1 228
13. Grubbing . . .	13	875	42	1 137	6	1 085	4	799	4	799	3	636	12	1 207	2	908	1	965	1	965
14. Ridging . . .	28	838	48	1 066	9	939	8	838	8	838	6	797	16	1 073	3	911	3	834	3	834
15. Spring-tooth Harrowing . . .	2	870	6	1 130	2	1 386	2	1 221	2	1 221	1	888	4	1 260	..	..	2	1 023	2	1 023
Two cultivations in tandem—																				
16. Harrowing and Rolling . . .	3	878	6	1 195	3	1 100	3	979	3	979	3	795	11	1 118	1	1 000	1	888	1	888
17. Harrowing and Discing . . .	..	..	5	1 363	..	..	7	1 122	7	1 122	1	1 000	4	1 355	1	1 850	3	1 396	3	1 396
18. Harrowing and Cultivating . . .	2	1 082	..	..	..	..	6	1 202	6	1 202	..	..	3	1 564	2	1 504	2	1 504	2	1 504
19. Spraying Potatoes . . .	2	943	6	1 056	2	1 635	..	..	..	..	..	..	3	974	3	855	..	..	..	..
20. Sweeping Hay . . .	2	663	2	1 087	..	..	..	..	..	..	..	923	13	979	1	531	1	768	1	768
21. Mowing Hay . . .	18	832	41	1 019	9	871	4	964	4	964	5	799	10	1 125	2	893	4	913	4	913
Outing grain with—																				
22. Power-drive Binder . . .	16	818	47	1 112	12	1 018	9	891	9	891	1	620	11	1 093	2	1 145	2	1 034	2	1 034
23. Trailer Binder . . .	17	782	46	1 080	7	1 055	5	801	5	801	5	782	20	1 321	3	870	5	941	5	941
24. Digging Potatoes . . .	25	783	56	1 070	12	976	6	850	6	850	5	730	24	1 050	4	918	..	..	..	..

ACREAGES DONE.

In view of the increasing degree to which our farmers have now switched over from a horse-economy to a tractor-economy, it may be of general interest if we set out figures of average performance by present-day tractors engaged on the day-to-day seasonal work of the farm. Table XI. shows the acreage done per 9-hour day by every group of tractors in both years, the figures for each job done being calculated to the nearest half-acre. Some farmers were unable for a variety of reasons to give details of acreage done; hence the numbers of tractors recorded on each job, as listed in this table, are generally smaller than those listed in Table X. Where the number of tractors recorded for any particular job is very small, the acreages should be treated with some reserve as they may relate to exceptional conditions of soil, gradient, weather, &c. It will be appreciated how quickly the modern tractor with its complement of implements can get over the ground on such jobs as ploughing, harrowing, cutting grain, or even digging potatoes, and what tremendous power it gives the farmer to overtake unavoidable arrears of work, even though there is still a place on the farm for an odd horse.

TRACTOR-OPERATING COSTS.

What does it cost to run a tractor for a year, including fuel, repairs and maintenance, depreciation, tax, and insurance? This depends on a great number of factors—its initial cost, its age during the year under review, the number of hours worked, the consumption and price of fuel, the nature of any repairs and renewals necessarily undertaken, and above all the care—or lack of it—with which it is housed and handled and regularly serviced. Table XII. gives relevant details, and average costs per year (excluding driver's wages) for each type of tractor in both 1944-45 and 1945-46, besides the range in total costs.

To cite the 1944-45 costs as an illustration, it will be seen that for 34 light tractors working on an average 1151½ hours, total costs per year amounted to £150, 7s. 10d.; for 94 medium tractors, working 1035 hours each, £137, 9s. 7d.; for 17 heavy tractors, working 1215 hours, £161, 10s. 8d.; and for 19 track-laying tractors, working 1058 hours, £223, 9s. 9d.

In all cases the average costs per year were slightly lower in 1945-46 than in 1944-45, except for the heavy tractors. For all the groups of wheeled tractors fuel was the heaviest item of cost in both years; depreciation was the next heaviest item, followed by repairs and maintenance, except for the medium group in 1945-46 where the position of the last two items was reversed. In the case of the track-laying tractors, their high initial cost was largely responsible for making depreciation the heaviest item of cost in

TABLE XI.—ACREAGE DONE PER 9-HOUR DAY.

JOBS DONE	1944-45										1945-46									
	WHEELED TRACTORS					WHEELED TRACTORS					WHEELED TRACTORS					WHEELED TRACTORS				
	Light		Medium		Heavy		Light		Medium		Heavy		Light		Medium		Heavy		Light	
	No. re-corded	Acres per day	No. re-corded	Acres per day	No. re-corded	Acres per day	No. re-corded	Acres per day	No. re-corded	Acres per day	No. re-corded	Acres per day	No. re-corded	Acres per day	No. re-corded	Acres per day	No. re-corded	Acres per day	No. re-corded	Acres per day
1. Ploughing—1-furrow	7	2	4	22	1	2	24	2	1	24	1	24	1	24	1	24	1	24	1	24
2. " 2-furrow	27	3	39	3	11	3	24	6	3	24	3	24	3	24	3	24	3	24	3	24
3. " 3-furrow	..	..	9	4	1	4	..	9	..	..	..	..	..	..	..	..	..	..	..	..
4. " 4-furrow	..	..	1	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5. Discing	17	11	41	12	9	13	12	7	12	12	11	11	..	..	..	..	..	..	..	..
6. Harrowing	26	23	66	25	9	22	14	30	19	19	22	25	3	35	3	35	3	35	3	35
7. Rolling	15	23	44	29	9	32	9	37	9	19	22	25	2	30	2	30	2	30	2	30
8. Drilling Seeds	..	..	24	14	3	13	3	18	3	13	4	14	2	21	2	21	2	21	2	21
9. Drilling Manure	13	13	24	15	3	18	3	18	3	18	4	30	1	10	1	10	1	10	1	10
10. Cultivating	23	9	44	9	5	9	13	9	13	9	13	8	10	12	10	12	10	12	10	12
11. Grubbing	11	9	31	10	6	10	4	9	4	9	11	10	11	10	11	10	11	10	11	10
12. Raking	25	9	40	9	7	8	4	8	4	8	4	8	4	8	4	8	4	8	4	8
13. Spring-tooth Harrowing in two cuttings in tandem	2	9	3	15	1	21	2	20	1	20	4	10	..	..	..	..	..	..	..	..
14. Harrowing and Rolling	3	13	6	19	3	24	2	13	2	13	6	16	..	..	..	..	..	..	..	..
15. Harrowing and Discing	..	..	3	8	..	..	3	15	..	..	..	..	1	14	1	14	1	14	1	14
16. Harrowing and Cultivating	9	11	..	..	..	..	6	9	..	..	3	10	..	..	..	..	..	..	..	..
17. Spraying Potatoes	1	31	6	18	2	11	..	..	..	..	3	18	2	22	2	22	2	22	2	22
18. Stacking Hay	3	11	1	13	..	..	..	..	..	..	3	7	..	..	..	..	..	..	..	..
19. Mowing Hay	17	17	28	17	8	10	4	62	..	..	10	13	1	16	1	16	1	16	1	16
20. Cutting grain with Power-drive Binder	15	7	24	7	10	7	5	6	..	..	7	10	1	8	1	8	1	8	1	8
21. Trailer Binder	11	11	32	6	4	6	3	3	..	..	16	7	1	14	1	14	1	14	1	14
22. Digging Potatoes	21	3	2	3	9	3	4	3	..	..	1	2	..	..	..	..	..	..	..	..

TABLE XII.—TRACTOR COSTS PER YEAR.

	WHEELED TRACTORS				TRACK-LAYING TRACTORS			
	Light		Medium		Heavy			
	1944-45	1945-46	1944-45	1945-46	1944-45	1945-46	1944-45	1945-46
Number of tractors recorded	34	7	94	32	17	5	19	11
Average purchase price (including capital additions)	£340	£3-9	£255	£244	£39~	£450	£8-0	£648
Average age at the commencement of the year	2 yrs. 2 mos.	2 yrs. 5 mos.	3 yrs. 7 mos.	4 yrs 5 mos	3 yrs. 11 mos.	3 yrs 3 mos.	3 yrs. 1 mon.	4 yrs.
Average number of hours worked during year	1151½	1195½	1035	1059	1215	1345½	1058	1180
Yearly average of fuel consumption per hour (T.V.O. or Diesel in gallons)	7.63	7.35	10.14	11.15	9.75	9.81	9.70	9.44
Fuel —T.V.O.	Galls. £ s. d.	Galls. £ s. d.	Galls. £ s. d.	Galls. £ s. d.	Galls. £ s. d.	Galls. £ s. d.	Galls. £ s. d.	Galls. £ s. d.
Diesel	479 44 17	579 42 2	1094 55 16	5 1179 56 10	1186 60 10	2 1321 63 5	441 22 10	3 414 19 10
Petrol	53 5 13	72 7 7	46 4 17	9 47 4 16	48 5 1	1 54 5 9	585 30 9	10 700 34 19
Lubricating oil	29 9 8	9 2 9	34 11 2	4 32 10 5	40 12 19	5 45 14 10	31 3 5	10 30 3 13
TOTAL FUEL COSTS	£59 19 4	£58 14 4	£71 16 6	£71 11 7	£78 10 8	£83 5 10	£66 11 7	£70 12 4
Repairs and maintenance	29 9 1	31 8 11	30 0 11	35 4 3	31 19 1	32 15 5	50 14 1	72 10 11
Tax and insurance	1 12 11	1 5 6	1 11 1	1 6 3	2 5 8	2 17 8	2 12 6	1 16 1
Depreciation	59 6 6	53 2 10	34 1 1	26 1 9	48 15 3	59 4 0	103 11 7	1 14 7
TOTAL TRACTOR COSTS	£150 7 10	£144 11 7	£137 9 7	£135 0 9	£161 10 8	£178 2 6	£223 6 9	£219 12 11
Highest tractor costs	£352 18 11	£224 8 7	£254 6 1½	£325 14 8	£235 14 11½	£203 19 4	£404 16 9½	£282 2 0
Hours worked by above tractor	1812	1392	1690½	1723½	1998½	1184½	1295	1447½
Lowest tractor costs	£78 2 1½	£100 0 6	£48 3 4	£62 16 2	£78 3 6½	£154 0 7	£104 3 6	£174 0 5
Hours worked by above tractor	634	640½	239	537½	621	1555½	560½	700

both years. In 1945-46 the composition of the operating costs of the track-laying tractors showed substantial changes from those of the previous year; with the average age of the tractors being greater in 1945-46 the cost of depreciation, calculated on the written-down values basis, was lower, and was closely followed by repairs and maintenance and by total fuel costs.

In view of the number of contributory factors, the variations in the total costs of running the individual tractors within each group for a year are very wide. In 1944-45 the difference between the highest and lowest costs of running a track-layer was just over £300. It is interesting to note that the heavy tractor with the lowest annual cost in 1945-46 actually worked over 350 hours more than the tractor with the highest annual cost.

FUEL.

What of the various components of cost? Let us first deal with fuel, for the average price of fuel is of major importance in determining the total annual cost of running a tractor, especially when it is worked continuously. T.V.O., diesel oil, and petrol were charged at the controlled price per gallon during 1944-45, but during 1945-46 several successive reductions in the prices occurred, so the following average prices per gallon were used:—

PRICE PER GALLON OF FUEL.

	1944-45			1945-46	
	s.	d.		s.	d.
T.V.O.	1	0½		0	11½
Diesel oil	1	0½		1	0
Petrol .	2	1½		2	0½

Lubricating oil was charged at 6s. 6d. per gallon during both years. If anything, this erred a little on the high side.

REPAIRS AND MAINTENANCE.

Repairs and maintenance covered not only all repair and maintenance work but also the cost of spare parts and grease. Since the only really accurate way of arriving at the actual annual cost of this item would be to obtain full details of all repairs, &c., on a large number of tractors for the whole of their working life, the difficulty of ensuring reasonably reliable figures in an investigation

which did not cover the full working life of a tractor will be readily understood.

Where there were no repair bills, or where the repair bills were very light, it was considered advisable to insert a moderate sum which varied with the initial cost and age of the tractor and the number of hours it worked during the year; conversely where the repair bills were excessively high, they were not charged in their entirety to the one costs year studied.

During both years the repairs and maintenance costs for all the wheeled tractors were about £30, although in every case the average was slightly higher in 1945-46 than in 1944-45. The track-layers had much higher costs of repairs and maintenance due to the necessity of renewing the tracks fairly frequently, and this was especially noticeable in 1945-46 when the repair and maintenance item amounted to over £70. Although repair bills inevitably increase with age, and to some extent with the amount of work done, efficient and regular maintenance work and good driving can do much to reduce the repair bills and to ensure economical operation and a longer working life to the tractor.

TAX AND INSURANCE.

The small item of tax and insurance included the annual road licence, which cost 5s., where the tractor was licensed for road work, and insurance such as the compulsory Third Party Insurance. In some cases farmers had taken out a Comprehensive Policy, which for the small additional cost had much to recommend it.

DEPRECIATION.

Depreciation during both years was calculated on the Inland Revenue Scale of 22½ per cent of the diminishing value, plus one-fifth obsolescence allowance during the year covered by the records. This method has some defects, but it has the merit of showing the actual sum to which the owner of the tractor is legally entitled as a contribution towards its ultimate replacement.

COSTS PER HOUR WORKED.

Table XIII. shows the average costs per hour of running a tractor of each type in 1944-45 and 1945-46. These figures have been obtained by utilising the annual cost figures in Table XII. and adding the appropriate wage per hour for the driver.

The driver's wages were arrived at by ascertaining the actual weekly wage (excluding overtime) paid during each year and averaging this out on the basis of a 50-hour week. The 5s. increase in wages commencing on the 16th April 1945 was allowed for in

the 1945-46 figures. The figures so arrived at were then increased to allow for National Health and Unemployment Insurance, and Workmen's Compensation Assurance, and an appropriate and variable proportion of overtime, finally, they were rounded off to the nearest halfpenny.

VARIATIONS IN COSTS.

In 1944-45 the wheeled-tractor costs per hour were almost identical in each group; the light tractors cost 4s. 2-34d. per hour, the medium tractors 4s. 2-88d., and the heavy tractors 4s. 2-91d. In 1945-46 the differences were slightly greater than in 1944-45; the light tractors cost 4s. 1-53d. per hour, medium tractors cost 4s. 3-10d., and the heavy tractors 4s. 5-77d. The average for wheeled tractors was only slightly higher in 1945-46 than in 1944-45, as the increase in wages was largely counteracted by the decrease in fuel costs. The costs of the track-laying tractors were lower in 1945-46 than in 1944-45—i.e., 5s. 5-67d. instead of 5s. 10-70d. This was mainly due to the considerable decrease in the depreciation charge. Average costs per hour worked in 1945-46 are depicted graphically for all four groups of tractors in Fig. 5 set out on page 24.

RISE IN COSTS SINCE 1935-36.

It may be of interest to refer to comparative costs of tractors collected in the same area in the course of a smaller investigation in 1935-36, carried out on similar lines. The comparison becomes clearer if we single out steel-wheeled Fordsons—the largest homogeneous type—of which 11 were costed in 1935-36, 29 in 1944-45, and 15 in 1945-46. Average costs per hour worked are set out in Fig. 6 on page 25.

During the past ten years there has been a 50 per cent increase in costs, and it will be seen that in 1935-36 it cost 34-2d. to run a steel-wheeled Fordson tractor, in 1944-45, 54-0d., and in 1945-46, 51-7d. The total costs per hour were slightly lower in 1945-46 than in 1944-45 in spite of the increase in wages. This was due to the longer hours worked and the greater age of the tractors, which nearly halved the depreciation costs.

In 1935-36 paraffin was 6½d. per gallon, and a tractor driver's wages averaged £2 per week. The 11 tractors costed in that year worked on an average 654 hours during the year, while the 29 similar tractors in 1944-45 worked 757 hours, and the 15 tractors in 1945-46 worked 965 hours. Depreciation was the largest item of cost in 1935-36, 11-8d., and repairs were very small. In 1944-45 and 1945-46 the depreciation had decreased, but the cost of repairs had trebled. Paraffin and wages were approximately twice as costly in the later years as in 1935-36.

COMPOSITION OF TRACTOR COSTS 1945/46

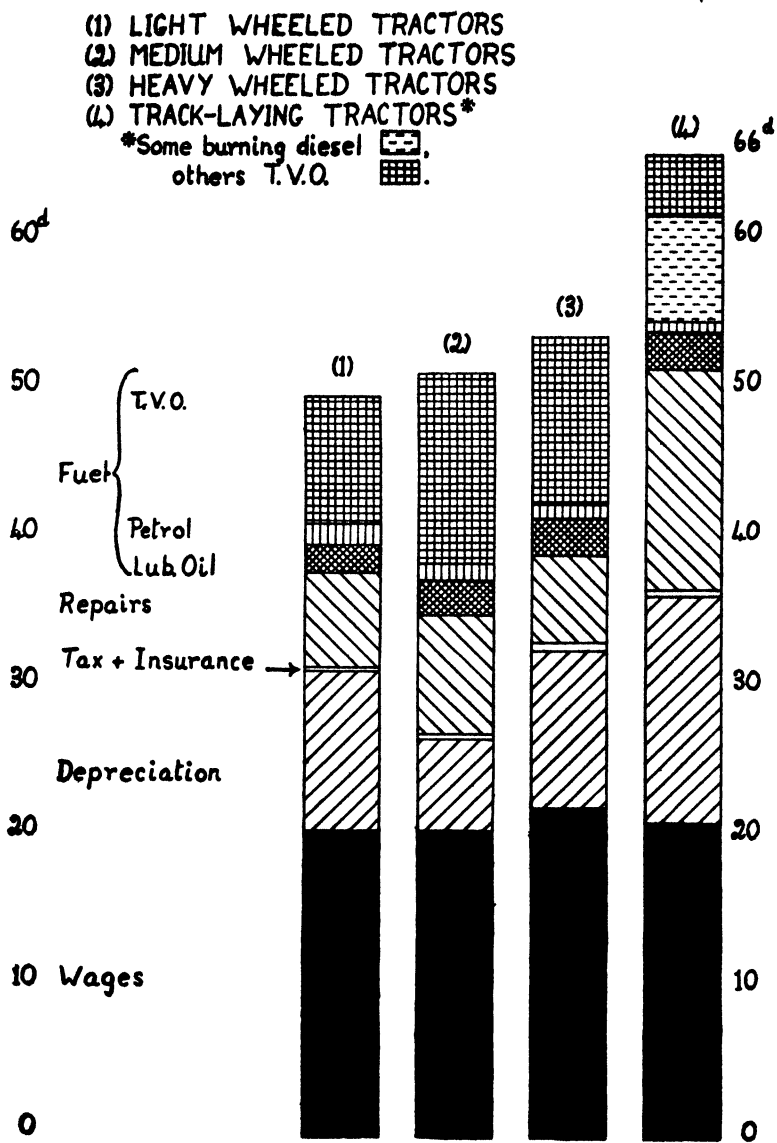


Fig 5.

COMPARATIVE TRACTOR COSTS per Hour Worked

- (1) Average of 11 steel-wheeled Fordsons, 1935/36 ~ 34.2^d
 (2) Average of 29 steel-wheeled Fordsons, 1944/45 ~ 54.0^d
 (3) Average of 15 steel-wheeled Fordsons, 1945/46 ~ 51.7^d

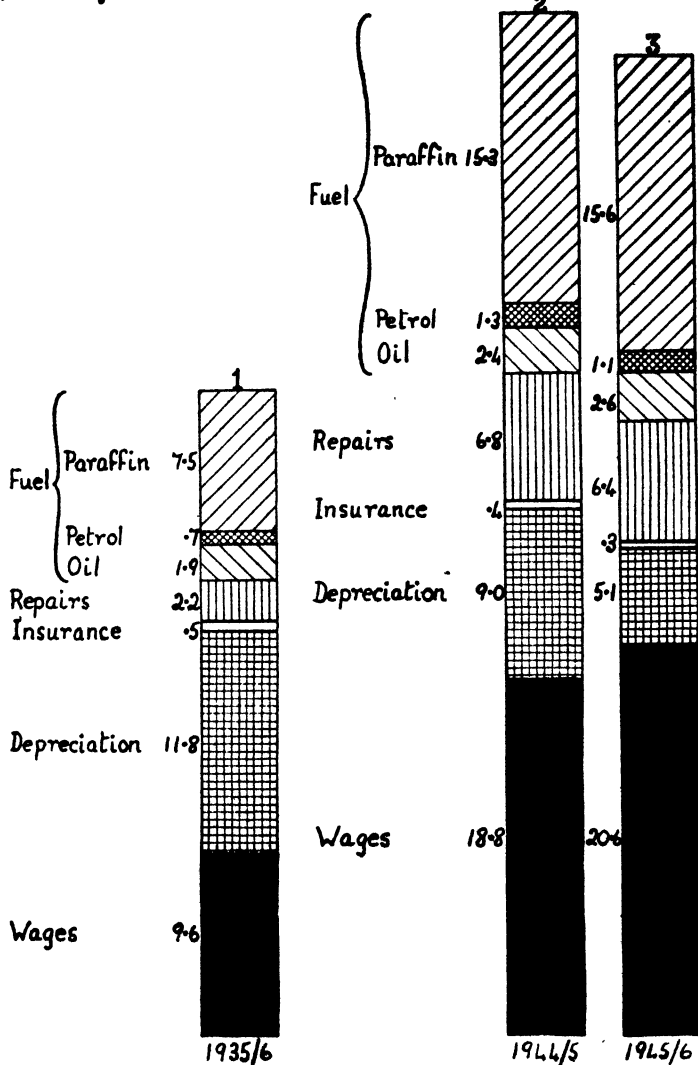


Fig. 6.

COST OF TRACTOR CULTIVATIONS.

It may rightly be asked what are the approximate costs *per acre* of tractor work, bearing in mind the operating costs of the tractor (including the driver's wages) and the cost of upkeep of the tractor-drawn implements. These are set out in Table XIV. for wheeled tractors and track-laying tractors operating in 1944-45 and 1945-46. The costs do not include any charges for binder twine, &c., or for any man-labour costs apart from the wages of the tractor driver. The costs are only for the actual productive time spent in doing each job ; no extra charges have been made to allow for bad weather, or breakdowns, or broken time.

The 1-furrow ploughs used by the wheeled tractors and the 2-furrow ploughs used by the track-laying tractors were deep-digging ploughs, and for that reason the cost of ploughing with them should be considerably higher than the costs of ploughing at ordinary depths.

The cost of work done by wheeled tractors fluctuated considerably, some cultivations being dearer in 1945-46, some cheaper. Mowing hay and cutting grain were cheaper during the second year than in 1944-45, due to the far better weather and the consequent better condition of the crops for harvesting ; otherwise there were no remarkable differences in the costs. Wheeled tractors in 1945-46 only did about three-fourths of the acreage of potato digging done in 1944-45, so the increase in the costs per acre was only to be expected. The decrease in cost of all jobs done by the track-laying tractors in 1945-46, excepting ploughing, is due to a decrease in their operating costs.

It must be kept in mind that the above costs per acre are based on tractors which worked over a thousand hours. Tractors doing less work would be more expensive, and tractors working longer hours might reasonably be expected to be cheaper. It may be opportune to point out that in those cases where tractor-drawn implements are worked for a very limited number of hours in the course of a year, the annual cost of their upkeep (repairs, renewals, and depreciation) spread over a small acreage may work out at an extraordinarily high cost per acre. To cite an extreme case, it is worth while placing on record that one of the wheeled tractors, working with a 3-furrow plough, showed the almost unbelievably high cost of £18, 8s. 3d. per acre ; and another, engaged on digging a small acreage of potatoes, showed an average cost of £13, 9s. 9d. per acre. By way of a contrast another tractor which rolled a very large acreage showed the surprisingly low operating cost of 11d. an acre—*i.e.*, only one-half the average cost shown in Table XIV.

TABLE XLV.
AVERAGE COSTS PER ACRE—MAN, TRACTOR, AND IMPLEMENT.

JOBS DONE	WHEELED TRACTORS		TRACK-LAYING TRACTORS	
	1944-45	1945-46	1944-45	1945-46
	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>	<i>s. d.</i>
1. Ploughing—1-furrow . .	..	22 4	..	..
2. „ 2-furrow . .	15 5	16 6	19 0	23 6
3. „ 3-furrow . .	13 10	16 0	15 6	16 1
4. „ 4-furrow . .	..	..	13 2	14 9
5. Discing	5 4	5 8	5 4	3 9
6. Harrowing	2 4	2 3	2 2	2 0
7. Rolling	2 0	2 1	1 10	1 10
8. Drilling Seeds	4 10	4 11	4 7	4 2
9. Sowing Manure	3 11	2 8	3 9	2 9
10. Cultivating	6 1	6 9	7 1	6 2
11. Grubbing	5 9	6 2	7 2	..
12. Ridging	5 7	5 9	6 10	5 7
13. Spring-tooth Harrowing	4 9	4 6	3 5	2 11
14. Harrowing and Rolling .	3 6	3 6	4 11	3 6
15. Harrowing and Discing .	7 9	6 4	5 0	4 1
16. Harrowing and Cultivating .	6 2*	7 0	7 7	4 5
17. Spraying Potatoes . . .	5 3	3 11	..	..
18. Sweeping Hay	3 0	6 5	..	..
19. Mowing Hay	7 3	6 10	12 1	5 11
20. Cutting grain P.D. Binder .	12 4	10 6	16 3	10 9
21. Cutting grain Trailer Binder	10 10	8 9	14 3	9 9
22. Digging Potatoes . . .	19 2	23 5	25 1	..

* This figure should be accepted with some reserve, since it relates to only a small number of tractors working under exceptional conditions.

COMBINE HARVESTERS IN EAST AND SOUTH-EAST SCOTLAND.

As mentioned in the introductory part of this article, combine harvesters have been rapidly increasing in numbers since 1943, particularly in the east and south-east of Scotland. More than one-half of the combines in the country in 1945 were located in the adjoining counties of Berwick and Roxburgh in the fertile basin of the Tweed. This close concentration will readily be seen by reference to the accompanying map on page 29. Easily the most popular type of machine is the 12-ft. cut self-propelled combine. The 5 ft. and 6-ft. cut tractor-drawn machines are also deservedly popular, but the 8-ft. and 10-ft. cut combines are not so numerous in this area.

Rather unexpectedly, combine harvesters have proved themselves to be far more useful during the two exceptionally wet harvests of 1944 and 1946 than during the favourable weather of the 1945 harvest, for it was found that the self-propelled 12-ft. cut machines with their pick-up reel attachments could cut very badly laid crops far more easily than could a binder. Even if binders proved able to cut such crops, the tangled nature of the straw prevented neat sheaves being made, and in many cases the grain was very badly weathered in the stook before it was dry enough to stack. Where the crops were cut by combine harvesters the grain was safe from weathering once it was cut; there was no trouble with untidy sheaves; and if the moisture content of the grain was too high to allow it to be stored safely, it could be dried. Although drying added considerably to the cost of combining, the total cost would probably not exceed the total costs incurred in using a binder, in continually restooking in the field during the prolonged spell of adverse weather, in leading the stooks, stacking, thatching, and finally in threshing the grain—often a smaller yield of poorer quality grain.

In view of the increasing popularity of combine harvesters during the 1940's, an inquiry was undertaken by the College in 1944, 1945 and 1946, designed to obtain accurate data on their performance and operating costs. The results obtained during the first two years have already been published,¹ and the results of the third year are now being compiled. During 1945 detailed daily records were supplied by interested farmers for 41 combine harvesters. More general particulars were obtained for a further 54 combines, making a total of 95 combines studied. Originally it was not intended to cost more than one or two combine harvesters in 1946, but as more than twenty combine owners wished to keep cost records, the investigation was carried on for a further year on a smaller scale. In spite of the abnormally bad harvest weather

¹ Report No 2 (duplicated) Combine Harvesters in East and South East Scotland,
1944 (September 1945)
Bulletin No 1 (printed) Combine Harvesters in East and South-East Scotland,
1945 (June 1946)

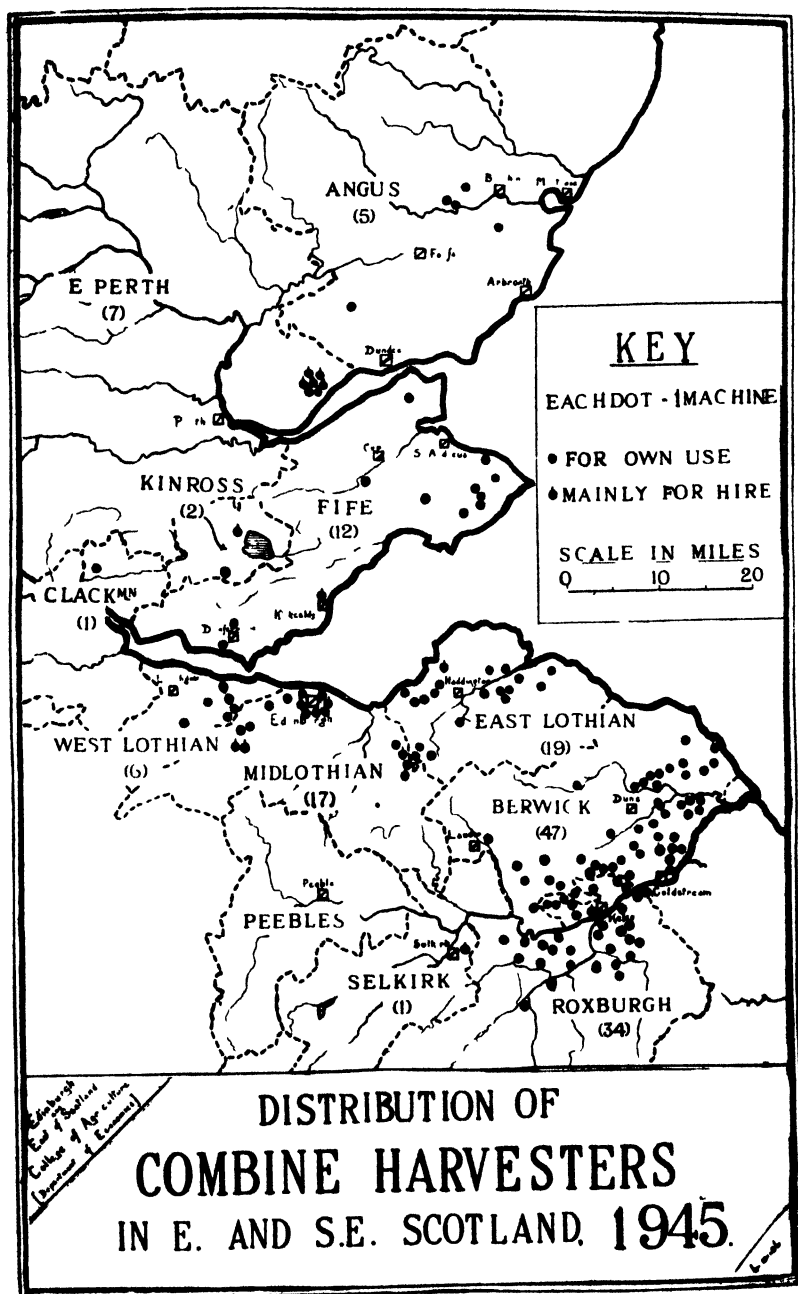


Fig 7

in 1946, complete daily records were supplied for 22 combines and information of a general nature was obtained for 3 more machines.

The decision to buy a combine harvester is not one that can be lightly made, for, apart from its effect on the organisation of the farm, it involves a heavy capital outlay. The average purchase price of the 60 12-ft. self-propelled machines costed in 1945 was £962; that of the 14 8-ft. and 10-ft. combines was £631; whilst the 21 5-ft. and 6-ft. machines studied had an average cost of £418.

Naturally most of the combine harvesters studied were to be found on large arable or mixed farms, although the size of farm varied considerably. In 1945 the average size of these farms was 735 acres, ranging from 162 to 2537 acres, although some of the farms had more than one combine harvester. Approximately 40 per cent of the total acreage of these farms was devoted to the production of grain crops. The largest grain acreage of all—817 acres—was grown on a farm which had three 12-ft. cut combines. The smallest farm of 162 acres grew 95 acres of grain, most of which was combined by a 5-ft. cut machine.

For a variety of reasons, barley proved to be easily the most popular grain crop to be harvested by combines in this area. Most farms in this area require all the oat straw for feeding cattle, and the wheat straw for thatching, covering potato pits, and bedding, while any surplus can usually be sold to paper mills at a good price. Since all grain crops must be dead ripe before they are combined, any oat straw harvested by combines is not of such good feeding value as that harvested in a less ripe condition by binders. The mechanism of a combine harvester breaks the straw more than does that of a threshing mill, so that the wheat straw from combined crops is no good for thatching. Moreover, barley is the chief grain cash crop in this area, and it is essential that it should be harvested in first-class condition to be suitable for malting. Wheat is usually more rapidly combined than barley, due to its being easier to thresh. Oats are generally the slowest crop to combine, the large amount of straw preventing the combine from threshing them quickly.

Table XV. shows the percentage composition of the total acreage of grain combined in each county by the 95 combine harvesters studied in 1945.

Berwick and Roxburgh, the two counties which together had nearly half the combine harvesters working in Scotland situated within their borders, are the two counties best represented in this investigation.

Of all the grain harvested by these 95 combine harvesters, 69 per cent was barley, while 17 per cent consisted of oats, and the remaining 14 per cent of wheat. The three Lothians combined the highest percentage of barley, which was as much as 86 per cent in Midlothian. The proportion of oats combined increased in Fife and Kinross, and rose to 66 per cent in Angus, while the highest percentage of wheat combined—viz., 21 per cent—was in Roxburgh. The total acreage of grain combined by the 95 combine harvesters studied during 1945 amounted to 14,322 acres.

TABLE XV.

PERCENTAGE COMPOSITION OF TOTAL GRAIN ACREAGE
COMBINED IN 1945 BY 95 MACHINES.

COUNTY	No. of Combines studied	Percentage Composition of Total Acreage			Grain Acreage combined in 1945 by 95 Machines
		WHEAT	BARLEY	OATS	ALL GRAIN
		%	%	%	Acres (- 100%)
Berwick	27	11	68	21	4,070
Roxburgh	28	21	63	16	4,552
East Lothian	16	11	78	11	2,332
Midlothian	11	9	86	5	1,398
West Lothian	2	8	74	18	273
Fife	9	12	65	23	1,420
Kinross	1		52	48	115
Angus	1	3	31	66	162
TOTAL	95	14	69	17	14,322

Only 6 of the 82 farms studied in 1945 cut all their grain with combine harvesters, but roughly one-third of them combined all their barley. The majority of the farmers preferred to use their binders for some of their grain so as to have two methods of harvesting available, and to avoid as far as possible, the difficulty of having to store large quantities of grain.

Of what real significance are combine harvesters when related to the whole grain crop grown in the College area, or in Scotland as a whole? By using the figures obtained in the 1945 investigation and relating them to official cropping statistics for 1945, it was estimated that the percentages of 1945 Scottish grain crops harvested by combines were as follows:—

	Wheat Per Cent	Barley Per Cent	Oats Per Cent	All Grain Per Cent
East and South-East Scotland	4.1	12.3	1.4	5.5
All Scotland	4.0	7.6	0.5	1.9

In other words, combines handled rather more than one-twentieth of the grain grown in east and south-east Scotland, but barely one-fiftieth of the grain crop of the whole country.

Table XVI. gives the comparative performance of the combine harvesters studied in this area during the harvests of 1944, 1945, and 1946.

TABLE XVI.

COMPARATIVE PERFORMANCE OF COMBINE HARVESTERS.

	1944			1945			1946		
	12 ft	8 ft - 10 ft	5 ft - 6 ft	12 ft	8 ft - 10 ft	5 ft - 6 ft	12 ft	8 ft - 10 ft	5 ft - 6 ft
	Acreage cut			Acreage cut			Acreage cut		
Per combine	164 0	127 5	100 5	181 5	115 0	96 5	191 5	108 5	113 5
Per foot of cutter									
bar	13 7	14 2	17 1	15 1	14 4	14 9	16 0	13 6	10 8
Per hour	1 06	0 84	0 66	1 15	0 83		1 09	99	1 03
Number of combines studied	34	4	8	60	14	21	18	3	4

It is interesting to note that, in spite of the appalling harvest weather in 1946, the 12-ft. cut combine harvesters cut an average of 10 acres more per combine than in the good harvest year of 1945. One 12-ft. cut self-propelled combine harvester in Roxburgh actually cut 304 acres (25½ acres per foot of cut) of wheat, barley, and beans in 1946. The speed per hour of combining was slower for the 12-ft. cut combine harvesters in 1946 than in 1945, but this was probably due to the very heavy crops, which in many cases were badly laid, and to the wet ground which caused a certain amount of bogging. The 8-ft. and 10-ft. cut combines did less work during 1946 than in the two previous years, but the amount they did cut was done at a higher speed. The 5-ft. and 6-ft. cut tractor-drawn combine harvesters continue to show up well and had an excellent record during 1946: they combined a considerably larger acreage than in 1944 and 1945, and were almost as fast at cutting it as the 12-ft. cut combine harvesters.

COST OF COMBINING.

Table XVII. shows the costs per hour and per acre for the three groups of combine harvesters "combining direct" in 1945.

Labour and power included all the labour and power involved in getting the grain into the combine tank, or into bags on the combine. Man labour was charged at the actual wage rate per hour the men received, which was usually above the minimum wage rate. Where the combine was tractor-drawn, the running costs of the tractor were charged at standard rates per hour based on the results of our 1944-45 Tractor Costs Investigation.

TABLE XVII.

COMBINE HARVESTER OPERATING COSTS, 1945.

(Average costs of combining DIRECT only.)

	12-ft Combines	8-ft 10 ft Combines	5 ft 6-ft. Combines	All Widths *
Number of combines studied	31	5	5	41
Total acreage cut and costed	4674	488	514	5676
Total hours worked and costed	4153	579	531	5263
	£ s d	£ s d	£ s d	£ s d
Costs per HOUR -				
Labour and power . . .	0 2 3	0 5 0	0 3 11	0 2 9
Fuel	0 3 11	0 2 8	0 2 6	0 3 7
Insurance	0 0 8	0 0 5	0 0 4	0 0 7
Repairs, maintenance, and oil	0 2 11	0 3 7	0 2 6	0 3 0
Depreciation	0 18 1	0 15 6	0 8 9	0 16 7
TOTAL	£1 7 10	£1 7 2	£0 18 0	£1 6 6
Bagging, carting, and dress- ing	0 7 8	0 6 6	0 6 0	0 7 4
Overheads	0 3 8	0 3 2	0 3 3	0 3 7
TOTAL COSTS	£1 19 2	£1 16 10	£1 7 3	£1 17 5
	£ s d	£ s d	£ s d	£ s d
Costs per ACRE -				
Labour and power . . .	0 2 0	0 5 11	0 4 0	0 2 9
Fuel	0 3 8	0 3 8	0 2 8	0 3 6
Insurance	0 0 7	0 0 6	0 0 4	0 0 7
Repairs, maintenance, and oil	0 2 8	0 4 5	0 2 7	0 2 10
Depreciation	0 16 7	1 0 11	0 9 1	0 16 2
TOTAL	£1 5 6	£1 15 5	£0 18 8	£1 5 10
Bagging, carting, and dress- ing	0 6 10	0 8 6	0 5 11	0 6 11
Overheads	0 3 4	0 4 1	0 3 3	0 3 5
TOTAL COSTS	£1 15 8	£2 8 0	£1 7 10	£1 16 2

* Weighted averages

Fuel included T.V.O. or petrol charged at the actual price delivered to the farm. Only the T.V.O. or petrol actually used on the combine harvester was included in this item.

Insurance varied considerably. In some cases the insurance policy was comprehensive, and in others it covered fire alone. This

item also included the 5s. road licence where a self-propelled combine harvester had to be taken on the road. All the licensed combine harvesters were insured against Third Party Risks.

Repairs, maintenance, and oil included a sum for repairs based on the actual repair bill, subject to some slight adjustment determined by the age and previous history of the combine and the amount of use made of it during the season. The actual time spent on servicing the combine harvester before, during and after the harvest, and the lubricating oil used on the combine, were also charged in this item.

Depreciation was charged at the standard rate of 15 per cent on the written down value allowed by the Inland Revenue authorities plus the one-fifth obsolescence allowance operative in 1945, or the one-fourth obsolescence operative in 1946. The 20 per cent Initial Allowance now authorised was *not* included.

Bagging, carting, and dressing included all labour and power required for the haulage of the grain from the field to the steading, and any labour incurred on dressing and bagging the grain, loading on to lorries, &c.

Overheads were calculated at 50 per cent of the total direct labour bill, in accordance with tentative recommendations made by the Scottish Conference of Agricultural Economists.

It will be seen that the average operating cost for all types of combines was £1, 17s. 5d. *per hour*, the larger machines having the higher costs. Costs *per acre* average £1, 16s. 2d. and afford an illuminating contrast. The 8-ft. and 10-ft. cut machines work so much more slowly than the 12-ft. cut machines that the former—all but one of which are tractor-drawn—show the highest costs of all, 12s. 4d. an acre dearer than the 12-ft. cut machines; and the excellent performance of the 5-ft. and 6-ft. machines shows them to be the most economical of all.

In no case, however, could combining be described as cheap: the depreciation on these costly machines, most of them almost new, spread over a comparatively limited acreage, makes the cost of depreciation per hour or per acre a heavy charge. The obvious way to decrease this—*i.e.*, by increasing the acreage combined—is frequently impossible of attainment unless the farmer is prepared to shoulder the risk of altogether losing some of the crop. Some reduction of the labour costs may possibly be achieved by a careful study of the organisation of the harvesting staff working in the field and in the steading.

It is interesting to note that the costs per acre of combining direct the different types of grain with the 12-ft. cut machines in 1945 were as follows:—

	Wheat	Barley	Oats	All Grain
Number of machines	21	31	10	31
Costs per acre	£1 9 6	£1 18 7	£2 0 6	£1 15 8

The average cost of picking-up loose grain—a method of harvesting adopted by 10 combine harvesters studied in 1945—was 10s. per acre more than the cost of combining direct. In four cases grain was picked up from the stook. This method was very expensive, costing on the average 30s. an acre more than combining direct.

Reference may here be made to the operating costs of a number of machines in 1946. The weighted average costs *per acre* of combining direct in 1946 with all types of combine harvesters was £1, 17s. 5d. as against £1, 16s. 2d. per acre in 1945. Considering the extremely difficult harvesting conditions in 1946 this slight increase in the costs per acre of combining direct reflects very favourably on the use of combine harvesters in bad seasons.

The 17 12-ft. cut machines costed in 1946 had the following average costs per acre of combining different types of grain direct:—

	Wheat	Barley	Oats	All Grain
Number of combines .	8	17	11	17
Costs per acre . . .	£1 5 11	£1 16 2	£2 0 7	£1 16 1

The average costs of combining wheat and barley were both lower in 1946 than in 1945, while the cost per acre of combining oats was only 1d. higher in 1946 than in 1945. The over-all average cost per acre of combining direct was 5d. an acre more in 1946 than in 1945. The average cost per acre of picking-up loose and picking-up ex stook by a small number of 12-ft. cut combines was considerably lower than in 1945.

GRAIN DRYING AND STORAGE.

Unfortunately, in a somewhat unfavourable climate such as ours, the cost of harvesting grain does not end with combining or bagging, for often both drying and storage are a virtual necessity which add considerably to the costs so far set out.

Grain drying and storage are indeed two of the major problems which have been caused by the increase in the popularity of combine harvesters. In a few cases farmers have erected their own grain driers, besides silos for storing the grain, but in most cases the grain has to be sent away to be dried and then sold at once because the farmer lacks sufficient storage facilities himself. In a good harvest year, such as 1945, this may lead to the glutting of the market for malting barley when grain cut by binders is being threshed from the stook and sold, while combine harvesters are

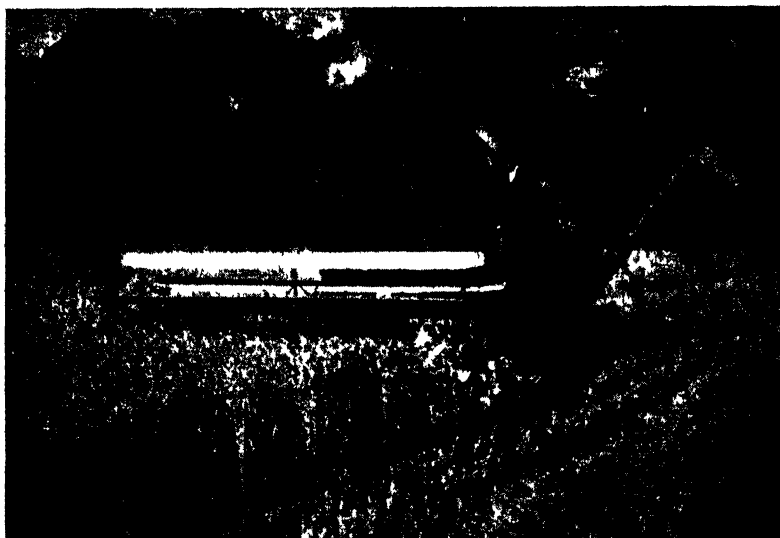


Fig 8 A self propelled 8 foot cut Massey Harris tank combine cutting wheat
 The combine was used entirely for experimental work in 1945
 (Photograph kindly lent by Mr G. C. Taylor Inchtuthill Perthshire)



Fig 9 A steel self emptying grain hopper made on a West Lothian farm and
 holding 30 40 cwt of grain emptying in 60 seconds
 (Photograph kindly lent by Messrs C. & M. Ross Niddry Malus Winchburgh)

working long hours. It seems, therefore, that where a farmer has large acreages of grain which he combines, the large capital outlay on a grain drier would be justified. One of the difficulties as far as barley is concerned is that brewers do not like accepting barley which has been dried by the farmer as they fear that the grain may not germinate—a fact which emphasises the necessity for closer co-operation between the farmer and the grain merchants and brewers.

The following simple points in combining could with great advantage still be borne in mind by farmers :—

1. Cut only when the grain is dead ripe for combining.
2. Try to ensure a sample reasonably uniform in physical condition so that moisture content is likely to vary within comparatively narrow limits, preferably 20 per cent or thereabouts.
3. Consider the advisability of installing a pre-cleaning plant on the farm.
4. Work as closely as possible with the merchant so as to ensure a smooth flow of grain supplies to his plant.

STRAW DISPOSAL.

The problem of straw disposal is also of vital importance. Up to now three alternative methods have been tried, none of which is entirely satisfactory. The first method is to collect the straw—either by means of a pick-up baler, or by sweeping the straw to a stationary baler with a tractor and hay sweep, or by lifting it and stacking it loose. The second method is to spread it in the field to be ploughed-in in due course, sometimes after it has been trampled in by cattle. The third and simplest method is to burn it—an effective method which for obvious reasons is open to criticism.

The high cost of a pick-up baler and the resultant heavy depreciation per acre (not to mention the large amount of labour required to operate such a machine) makes a very heavy charge against the cost of handling the straw. Sweeping the straw to the edge of the field with tractors and hay sweeps and there baling it is often more satisfactory. Lifting it and stacking it loose is usually rather costly in labour, but during the 1946 harvest, in one or two cases, men were employed doing this when they were unable to do any other work. Ploughing-in the straw at least returns the manurial value of it to the soil, although it is not always an easy job. Burning the straw is only to be advocated when it is very thick with weed seeds.

Table XVIII. indicates the extent to which the various methods of straw disposal found favour in 92 cases studied during the 1945 season.

TABLE XVIII.

METHODS OF DISPOSAL OF STRAW FROM COMBINED GRAIN CROPS, 1945.

	WHEAT		BARLEY		OATS		ALL STRAW	
Number of records studied	46		81		49		92	
Methods of straw disposal	Acres	%	Acres	%	Acres	%	Acres	%
1. Collected by—								
(a) Pick-up baler	660	36	1 731	21	780	37	3 171	26
(b) Sweeping to stationary baler	98	6	978	11	238	11	1,314	11
(c) Lifting and stacking loose	150	8	1 128	14	377	18	1,655	13
	908	50	3 837	46	1,395	66	6,140	50
2. Ploughed-in	291	16	1 245	15	367	17	1,903	15
3. Burnt	628	34	3,290	39	362	17	4 280	35
TOTAL	1,827	100	8 372	100	2,124	100	12 323	100

Many farmers tried all five methods of straw disposal, while a few used only one method—*e.g.*, pick-up baling it all or burning it all. About one-half of all the straw was collected by various means; nearly one-sixth of the straw was ploughed-in, and about one-third of all the straw was burnt, which must surely have involved a considerable loss of fertility. It was noticeable that a smaller proportion of all kinds of straw was burnt in Midlothian and Fife than elsewhere.

To the large-scale stock-feeders on the farms in east and south-east Scotland, anxious to ensure an abundant supply of straw for their cattle-courts so as to maintain the fertility of their arable land whilst seeking the obvious benefits of mechanising to the utmost their methods of grain harvesting, the new twine-tying pick-up balers operated by one man may possibly provide the solution to the straw disposal problem, if these machines can be put on the market at a reasonable price. They were operating in Scotland during the 1946 harvest and attracted considerable attention.

PROSPECTIVE DEVELOPMENTS.

So far as impartial and non-technical investigators can see, what prospects of advancement in the technique of farm mechanisation do the next ten years hold out for British agriculture, even within the limited field we have assigned to ourselves in this article—*i.e.*, the replacement of horses by machines in work on the land? It may perhaps be argued that it is not the proper sphere of the agricultural economist to discuss technical improvements, and

that he is not competent to do so ; nevertheless our unrivalled opportunities for obtaining a representative cross-section of informed opinion from experienced farmers prompt us to put forward the suggestions set out below. They do at least indicate the immense possibilities of development, even in this comparatively narrow field, and show how much is needed now.

In the light of information set out in the foregoing pages, we are of the opinion that very often the operating costs of both tractors and combine harvesters cannot be regarded as cheap, but cheapness is not necessarily the main consideration. One of their major advantages, assuming that the farmer is able to face the heavy initial capital outlay involved, is their immense potential for overtaking vital seasonal work when time presses—as it usually does—or when labour is short—as it is likely to remain—or when weather conditions chance to be favourable. (Even yet, however, there is still a place for the horse on the farm, as many farmers found out in the chaotic conditions prevailing in the dismal weather of spring 1947.)

TYPES OF TRACTORS.

The main requirements in modern farm implements are simplicity, strength, accessibility, and ease of working. How do present-day tractors, implements, &c., conform to these desiderata ? Let us consider in turn the type of tractors themselves, the nature of their fittings, and the type and suitability of farm implements in general use. As to wheeled tractors, for instance, it is generally considered that a better distribution of weight, with the draw-bar deriving from in front of the back axle, would be an improvement ; and on some types of tractors the turning radius is not small enough. Further, tractors which would warm up rapidly and keep warm even while idling in cold weather would be invaluable. Many farmers advocated the merits of easily interchangeable steel wheels and rubber tyres, or, alternatively, of an efficient set of metal spuds which could be fitted over rubber tyres without damaging them.

The double front wheels fitted on some row-crop tractors came in for criticism as being too big and clumsy ; when these tractors are working among potatoes rather late on in the season, it was pointed out, the shaws are often badly damaged by the front wheels. It was also felt that a comparatively inexpensive four-wheel drive tractor would be a great boon on marginal upland farms with hilly land where a track-layer, owing to its high initial cost, could hardly be regarded as an economic proposition.

As to the track-laying tractors, some farmers maintain that there is room for improvement in the design of the tracks. At present, on heavy land, the soil and the stubble become compressed in the links, thus causing excessive wear and tear.

TRACTOR FITTINGS.

All tractors should now be fitted with self-starters, belt pulleys, power take-offs, and hydraulic lifts as standard fittings.

Fuel gauges for petrol and paraffin or diesel would be a great convenience. Many individual tractors burning T.V.O. are very heavy on fuel, and it seems possible that if more wheeled tractors could be designed so as to burn diesel oil, they might be more economical in their consumption of fuel whilst still producing the same power.

A hand-clutch, brake, and gear which could be operated from the ground would greatly facilitate leading-in at harvest-time and would prove very popular.

Nor must one forget the driver. It is not improbable that a more effective silencing device on tractors, without reducing the power, would make them less tiring to drive. Many farmers, moreover, would like their tractors to be more comfortable for the drivers, especially in cold weather. A wind- and water-proof cabin, which could be easily detached in summer, possessing windows (with windscreen wipers) to allow the tractor-driver to watch the implement he is pulling, as well as to see where he is going, would be warmly welcomed. Most tractors could do with more comfortable seats on the lines of those on Caterpillar D2 tractors.

TRACTOR-DRAWN IMPLEMENTS.

Even assuming no further spread in the range of operations undertaken by tractor-drawn implements, the near future should see far-reaching improvements designed to increase their ease of handling, their power, and the smoothness and efficiency of their work.

Three major improvements would find general support amongst all interested farmers—viz., first, the standardisation of farm implements, which would reduce the bewildering multiplicity of types and designs at present in use, without, we think, any loss of efficiency; secondly, easy and rapid coupling of implements to the tractor; and thirdly, not only a better supply of spare parts for both tractor and implement, but also better protection for the parts of both which are easily affected by dust, besides more easily accessible lubrication points.

Better spring hitches and automatic releases are required in tractor-drawn implements to avoid breakages. In some cases with heavy implements a screw jack to raise the hitch to the correct height would be very useful. Implements which will utilise the full power of the tractors are in great demand. More and better tandem hitches are required so that a track-layer could pull, say, three cultivators abreast as has already been done successfully with rollers, harrows, and grain drills. All implements with handles

to move, such as ploughs, seed drills, &c., should be made so that they can be *easily* operated from the tractor seat. Markers are required for jobs like drilling seeds to make it easier not to overlap, or leave strips unsown. Some implements could do with broader wheels to avoid sinking in.

As far as combine harvesters are concerned, a light 8-ft. cut combine harvester with a drum of the same size as that on the Massey-Harris 12-ft. cut combine, but with an adjustable screen, would be desirable. Many farmers would like a really efficient bunching device to deal with the straw.

CONCLUSIONS.

Looking beyond the immediate horizon, however, we see almost unlimited scope for developments in farm mechanisation, notwithstanding the fact that every advance therein impels the farmer to sink increasingly large sums of capital in implements, which in many cases are used for a very limited number of hours each year, as, for example, combine harvesters. In view of the scarcity of skilled labour and the probable continuance of high labour costs, we can see no possible alternative to an increasing degree of farm mechanisation. In the east of Scotland, for instance, if potatoes are to retain their place in the farm economy as our principal cash crop, improved mechanical potato harvesters, instead of our present slow and heavy models, perfected and put on the market at a reasonable price, will soon have to come into general use; and revolutionary though it might seem at present, a place might yet have to be found on our large arable and mixed farms for root harvesters, mechanical dung fillers and spreaders, and other implements.

Similarly, we should see big developments in grass drying, in mechanised dairying, and in the utilisation of electricity in agriculture. We are on the threshold of very big developments in the whole field of farm mechanisation, some of which should reach fruition just as soon as ever labour and materials are available to the agricultural engineering industry.

It is, however, becoming more and more evident that one of the added risks inherent in a high degree of farm mechanisation is that, all too often, the men who have to operate the increasingly complicated machines entrusted to them do not know enough about their care and maintenance. Many avoidable breakdowns are caused by lack of technical knowledge on the part of the farm workers. It has been suggested that classes or short courses of instruction at farm institutes, designed to train tractor drivers to become sufficiently competent to service their tractors properly and to effect minor running repairs, should be run during the slack periods of the year—*e.g.*, between haymaking and harvest-time. There is much need for a class of well-paid farm engineer-handymen who can turn their hand to any job in overhauling and repairing

farm tractors, lorries, implements, and machinery. The award of Certificates of Proficiency to those who successfully passed such tests at the end of specialised short courses, which would entitle them to demand a high level of wages, might encourage the development of such a class of responsible and skilled technicians, to the benefit of Scottish agriculture as a whole.

This much is certain. Whatever may be the future rôle assigned to our agricultural industry in the economy of the nation, whatever may be the future of the Government Tractor Pools, which played so vital a part in our war-time food production campaign, and may yet be of paramount importance in facing up to our national problem of marginal land, farm mechanisation will come increasingly into prominence. In British agriculture, the nineteenth century ushered in epoch-making triumphs by the agricultural chemist; the twentieth century, and particularly the second half of it, will go down to posterity as the age of the agricultural engineer.

FORESTRY: YESTERDAY, TO-DAY, AND TO-MORROW.

By SIR GEORGE I. CAMPBELL of Succoth, Bt.

STEADILY, if slowly, public opinion is awakening to the need of a forestry policy in our country. Two wars have been necessary to bring about the dawning of this recognition in the public mind, and we must surely welcome it! For of truth a healthy and progressive forestry policy is as essential to our economic welfare as is a healthy, progressive, and enlightened agricultural programme. In times of crisis, timber is as necessary to the life and fighting ability of a nation as is food, but timber requires much more space in a ship than food.

In the 1914-18 war we only partly learnt this lesson. There are signs, however, that the second war, from which we have recently emerged, has brought the lesson home to us.

It is therefore appropriate that the 'Transactions' should at this time open its pages to Forestry, for fundamentally Forestry is just another form of Agriculture, and though it requires a much longer "rotation," the forester, like the farmer, is engaged in the growing and production of a crop.

If we wish to obtain a balanced view of the position of Forestry to-day and to study its impending development, it is necessary to glance briefly at the position as it was in the years between the wars; for in that period can be placed the emergence of a definite national forest plan, which ended the *laissez-faire* unco-ordinated and undirected attitude with regard to forestry which had hitherto pertained.

While it is true to say that the experience of the first Great War marks the beginning of planned forestry, we must not omit to note that during the eighteenth and nineteenth centuries much planting was done in Scotland, and many famous forests arose to succeed the ancient native woodlands largely exploited in earlier times, of which only vestiges now remain to us. The introduction of the sheep-farming system undoubtedly hastened the end of the natural forest. The succeeding planted forests were entirely the result of private enterprise, and were it not for the enterprise and initiative of many good Scottish lairds, we should now be in a sorry position; for it is on their experience of success and failure—but mainly success—that the forester of to-day has largely founded his technique. Scotsmen, too, were prominent in

the introduction of new and exotic conifer species from overseas, and it is these species on which we to-day depend for the bulk of our softwood forest crops. There are only three conifers indigenous to Britain—the Scots Pine, the Yew, and the Juniper. To the Duke of Atholl we owe the introduction of the Larch about 1725, and from Atholl also came, nearly two centuries later, the first Hybrid, the product of a natural crossing between the European and Japanese Larch. Norway Spruce was introduced from the continent at an earlier date, and considerably later Douglas and Menzies, two adventurous Scots, brought to our forests the Douglas Fir and the Sitka Spruce from the Pacific seaboard of North America. "Sitka" has proved itself to be a particularly valuable introduction, thriving as it does on poor acid peats in areas of heavy rainfall, and enabling the forester to put to a productive and remunerative use a type of land which to all practical purposes is otherwise almost sterile.

Scottish pioneers in the creation of forests—to whom we owe so much—could not alone and without assistance stand on their own feet and stabilise an industry. Economic influences, increasing taxation, and the importation of large quantities of foreign timber at comparatively cheap rates gradually knocked the ground from under their feet, and for many years prior to 1914, except on a few large estates, private forestry operations were conducted more for the production of the timber requirements of the estate itself than as a commercial undertaking. There was also a consequential deterioration from the high standard of forest management.

One of our greatest Scottish foresters once said about the privately owned and privately created forests of Britain: "They are neglected in peace but raided in war." By "neglected" he meant that neither the Nation nor the Government, in peace, showed any interest in them, no incentive was offered for their extension, maintenance, protection or improvement, but when war supervened they were thankfully but ruthlessly exploited. The official neglect subsisted up to 1911. The raiding has twice taken place in two wars, and in point of fact, as will be shown later, from the timber point of view the woodland proprietor has twice saved his country.

In 1913 Great Britain imported $11\frac{1}{2}$ million tons of timber and only produced from her own forests 500,000 tons or 7 per cent of requirements. By 1918 imports had been reduced to $2\frac{1}{2}$ million tons and home production had been increased to $4\frac{1}{2}$ million tons. To accomplish this enormous increase in production about 450,000 acres of our woodlands had been felled. These figures vividly illustrate how great was the "raid" on our forest reserves at that time of crisis.

In 1916 the Government, realising that a negative policy with regard to forestry could not, in the national interest, be allowed to continue after the war, and that it was necessary to increase home-grown supplies not only to replace the losses of war but as a guarantee for the future, set up a Committee, known as the Acland Committee after its Chairman, the Rt. Hon. Sir Richard

Acland, Bt., M.P. This Committee was charged with the examination of the whole timber position.

The Acland Committee produced a most comprehensive report in 1919. History has since shown that if the suggestions of the Acland Committee had been adopted in their entirety the country might have been better prepared as regards timber resources for the greater conflict which was to follow so comparatively soon. Be that as it may, this was indeed a most important turning-point in the history of British forestry, for the report of the Acland Committee impressed the Government, and in 1919 the Forestry Commission was born.

Thus, and only in 1919 and directly as a result of her experience in war, did Great Britain first acquire a State Forest Service. Not least among the nations of Europe, she alone had hitherto lacked such a service—surely a significant comment on the national disregard for an essential branch of the husbandman's art.

The Forestry Commission, though born so late, proved itself to be quite a lusty infant, if of a somewhat peculiar constitution. Its members were appointed by Royal Warrant and it was not responsible to any Minister of the Crown. Questions in either House of Parliament, with regard to its functions and operations, could only be answered by a Forestry Commissioner who was also a Member of Parliament, or by one who was also a Peer. The Commission was constituted by the Forestry Act of 1919, which also defined its powers and duties. To finance its operations a Forestry Fund, fed by Parliamentary Vote, was inaugurated. This somewhat novel constitution of an operational department of State had its advantages in the early life of the Commission, which was breaking new ground. It enabled it to get ahead without being constantly called to account, and to use a certain freedom of action which, under a more normal set-up, might not have been possible.

The Commission was charged with two main functions—the creation of State or National Forests, and the encouragement of planting on private estates. It possessed powers to purchase, feu, or lease land for the purpose of afforestation.

Lord Lovat was the first Chairman of the Commission. No better Chairman could possibly have been found; for he was indeed a leader in character as a man, an agriculturist of note, as well as a skilled amateur forester. To his inspiring leadership the Commission owes much, for he could and did take a wide and balanced view. To a large extent he was able to steer the new service clear of the shackles of Civil Service departmentalism. Lord Lovat left his mark; for even to-day, after the lapse of years, it may be said—though all may not agree—that the Forestry Commission is the most human and least hide-bound of all our Government Departments.

It was perhaps natural that in the years between the wars the Commissioners tended to concentrate their efforts more on one of their main functions than on the other. For the first time in history a definite charge had been laid on a body of Commissioners, specially appointed for that purpose, to create State forests, and

they concentrated their efforts mainly to that end. The encouragement of private planting took second place. Perhaps this was not intentional, but in fact it was so. Up to the end of 1939, 1,114,000 acres had been acquired by the Commission in the United Kingdom, of which 368,878 acres had been actually planted. In the comparatively short period of twenty years the Commission became the largest landowner in Scotland.

Grants of from £2 to £4 per acre were made by the Commission to landowners as a measure of help towards the rehabilitation of their woodlands. Under this scheme some 125,862 acres in private ownership were replanted. But this "measure" of help in the prevailing circumstances, combined as it was with facilities for technical advice—which was not always in fact available when required—proved insufficient to reinstate the war loss in the country's timber capital. The years between the wars were years of ever-increasing anxiety and uncertainty for landowners. Taxation rapidly increased, the incidence of death duties resulted in the break-up of estates, and an increasing uncertainty as to the future led to a feeling of insecurity. There was little capital to spare for planting; for afforestation, by its very nature, must always be a long-term investment. Markets for timber were poor and oncosts were ever rising. There was no assurance that even the thinnings from growing plantations, which are an essential product of sound silvicultural practice, could be disposed of without loss. In fact, there was no incentive to risk money in planting, and the grants and other services offered by the Commission, inadequate as they were in the light of the facts of the case and of the times, only attracted those few landowners who either happened to have a particular personal interest in forestry, and some money to spare, or those patriotic few who felt it their duty to plant and, in spite of the inadequacy of the inducement offered, were able to do so.

From 1930 onwards, periodic representations were made to the Commissioners by the Landowners' Organisations and the Royal Forestry Societies of both Scotland and England, urging that both more aid in the form of ancillary services and greater financial assistance should, in the national interest, be provided to the private forester. The Forest Authority, however, seemed to be preoccupied with what it considered to be its primary objective—the creation of State forests—and was insufficiently interested in the future of the private forest. Time and a second war have proved this to have been a short-sighted policy. In this connection it is interesting to note that even in 1931 the private interests in forestry were representing to the Commissioners that they foresaw the ultimate necessity of the institution of a measure of control of privately owned woodlands, if other forms of stimulation could not be provided. Here we find the germ of the "dedication" principle, which will be discussed later on in this article.

During this period the Commission had been steadily engaged in acquiring land and planting it, in the formation and stocking of forest nurseries, and in the institution of the many complementary services necessary to the functioning of a State Forest Service.

Forest schools were started, one in Scotland and one in England. Grants were made to Universities to provide for the training of Forest Officers and to other educational institutions. A programme of research was laid down and a Research Department built up. Useful technical bulletins, for the guidance of foresters in the practice of their craft, made their appearance, and the excellent system of Forest Workers' Holdings was evolved. This Forest Workers' Holdings system was a real advance. The tenant of this type of holding, an adjunct of a forest, being guaranteed a certain number of days' work per annum in the forest, is not alone dependent on his holding for his livelihood.

All this very real progress was not achieved without set-backs and grave anxieties. Governments and peoples soon forget the lessons of war. Political, economic, and financial crises beset the country. Forestry was a new child of the countryside and, like Agriculture, our oldest industry, its value was not understood by a people largely industrialised and with an urban outlook. In some quarters there was actual hostility, and it fell a ready victim to the strokes of the Geddes Axe and later restrictive measures. Great credit is due both to the Commissioners and to the over-worked but always zealous officers of the Commission that they fainted not nor failed at these set-backs, but adhered to the main plan and carried on. The main structure of the new service was not impaired, though the detailed "planning ahead," the essential *sine qua non* of forestry, was grievously upset.

In 1927 Lord Clinton, an owner of woodlands in both Devon and Kincardine, succeeded Lord Lovat as Chairman of the Forestry Commissioners, and he in turn was followed in the Chairmanship in 1929 by Sir John Stirling Maxwell, Bt., of Pollok, a man of great character and of many parts. To Scottish foresters Sir John was already well known, for he gave to British forestry the result of his private pioneering and successful experiments in the planting of recalcitrant peats on the high hill-country of Rannoch, the turf-planting technique which has enabled thousands of acres of sour wet moorland, of dwindling value for grazing purposes, to be successfully afforested. In 1932, on Sir John's resignation, Sir Roy Robinson¹ was appointed to the Chair, a position which he still occupies with great distinction.

In 1939 we were once more at war. British forests became important again. A strict control was immediately imposed. At first the greatest need was for timber to supply the mines, and many immature crops had to be ruthlessly sacrificed to the national need. A special department was set up, working at first under the Forestry Commission and latterly under the Ministry of Supply. The Home-Grown Timber Production Department, as it was named, was necessary to supplement the resources of the timber merchants, who could not expand far enough or rapidly enough to handle the enormous demand. Yet the timber merchants in the home-grown trade—whose business in peace-time was of limited scope and always somewhat precarious, owing to the

¹ Now Lord Robinson of Keilder Forest and Adelaide.

ravages of the 1914-18 war on the standing crops and the enormous bulk of cheap imports—did a wonderful job of work. The Forestry Commission's personnel was virtually split in twain on the advent of war, one half being seconded to the Timber Production Department, while the remainder carried on as best they could, with depleted staffs, with the care and maintenance of the forests planted between the wars. Soon a demand arose for heavy timber from British forests, though the urge to produce more and yet more pit-props never slackened.

In the endeavour to stimulate production and to meet the ever-increasing shortage of skilled labour, we had to call upon our Dominions and Colonies. The first to respond to the call, and before we were really sufficiently organised to receive them, were the Newfoundland contingent, followed later by emissaries from British Honduras. These contingents of various race and colour were by no means all skilled lumbermen, but the need was great and the output gradually increased.

By 1941 both Canada and Australia came to our aid. They sent units of their respective Timber Corps, who came over and worked as complete military formations under their own officers and with their own equipment.

In considering the gigantic effort made and the truly remarkable production achieved it is necessary to bear in mind two points. For reasons already outlined, the volume of available timber in the country was not as great in 1939 as it had been in 1914 when the first World War started. The wastage of that war had not been made up. Many of the forests then exploited had not been replanted. True, the Forestry Commission had in the interval afforested some 300,000 acres in nineteen years, but a nineteen-year-old wood is not old enough to produce anything more than thinnings as pit-props for the mines. The contribution from the young State forests therefore could not be great, and the heavy end of the stick once more fell on the owners of private woodlands. Once again the private owner literally saved the country. That is a fact not sufficiently recognised.

In many instances the woodland owner had to sacrifice capital, for immature woods had to be felled, and the owner only received their value, which naturally was very much less than he would ultimately have received if his investment had been allowed to run its normal course. While the Government possessed powers of compulsory acquisition, it is interesting to note that, in Scotland at any rate, these powers had seldom, if ever, to be exercised. Woodland owners responded magnificently to the call. In Scotland alone no less than 230,000 forest acres were felled to meet war demands, 385,200,000 cubic feet being produced from this acreage by all operators, departmental (Home-Grown Timber Production Department), trade (timber merchants), and the owners themselves by the labour of their own reduced staffs.

The saving to the country in shipping tons thus made available for the carriage of other vital war cargo amounted, for the United Kingdom, to no less a figure than 17½ million tons.

We can assess the effort made by looking at it from another angle. In the years immediately preceding the outbreak of war Great Britain imported some 93 per cent of its requirements in timber. Only some 7 per cent was produced from home-grown sources. In the peak war year we had stepped up our production from home sources to some 70 per cent of the total timber used, thus reducing our imports by two-thirds. We must remember, too, in considering these figures that, while we were not building many houses during the war, the Services required colossal quantities of timber, and the total consumption within the country was greater than in peace-time. Not a single ton of coal during the war period was lost for want of pit-props. As has already been mentioned, most of the pit-props, if not quite all, came from the woods of private owners.

Quite early in the war the Forestry Societies, both of Scotland and England, saw the writing on the wall. Being convinced that a much more comprehensive and vital national forest policy would be essential after the war, if private woodlands in which war exploitation had already reached alarming proportions were to be enabled to make their legitimate and necessary contribution to the future economy of the country, the Royal Scottish Forestry Society submitted its proposals to the Government. Among the suggestions then put forward the following may be noted to illustrate both what was wanting in pre-war direction and assistance and what the Society, after much careful thought, considered essential for the future well-being of forestry: "A competent Forest Authority charged with the direction of estate forestry (as distinct from State forestry) to be appointed." "All owners having on their estates woodlands over a stated minimum acreage, to register with the Forest Authority an undertaking to maintain their woodlands according to the principles of good forestry. In the event of failure to comply with this requirement the Authority to have power to take over the management of the woodlands." "The grower to be assured of a market at an economic price for the produce of his woodlands." "Grants for planting to be continued." "Maintenance grants to be made available." "Adequate steps to be taken to rid the country completely of the rabbit pest."

It will be noted that the necessity for a limited amount of control of private woodlands came from the representatives of the owners themselves. The preamble to the suggestions indeed contained a clause which pointed out that "the proposals which follow are made, not with the object of assisting the owner of private woodlands as an individual, but in the national interest."

In 1943 the Forestry Commissioners issued a report in the form of a White Paper. This White Paper, entitled "Post-War Forest Policy" (Cmd. 6447, H.M. Stationery Office, 2s.), is a comprehensive and exceedingly well-thought-out document dealing with the whole history of British forestry. It makes constructive and specific recommendations for its future conduct and administration. Target figures to cover the cost of carrying out the

programme of afforestation and rehabilitation, recommended as necessary for the safety of the country, are given.

The basic idea underlying the report, on which its arguments and recommendations are built up, is the necessity for ensuring that in any future national crisis Great Britain may not be caught out without sufficient reserves of timber to see her through. The country cannot rely a third time solely on the store of timber in privately owned woods, which alone has saved the situation in two wars. That store no longer exists. It can be readily appreciated that Great Britain can never hope to become self-supporting in timber. The island is too small, too highly industrialised, and the proportion of good land which must necessarily be retained for agricultural production is relatively high. If over a period of fifty years, however, five million acres of effective forest can be created, that area, the report argues, would ultimately provide us with 35 per cent of our requirements in timber. Such an area—the minimum necessary for national safety—would provide an assurance both against a possible shortage in world supplies and the necessity of importing timber under war conditions.

To attain the ultimate objective—five million acres of forest—the report lays down that three million acres of “bare” or hitherto non-afforested land will have to be turned over to forest crops, and two million acres will be found from the rehabilitation of existing woodlands. While five million acres in fifty years is laid down as the minimum necessary national insurance, the Commissioners suggested various alternative and graded steps, which they called the desirable and less desirable programmes. Eventually the Government decided that, while accepting the recommendation in principle, it could not commit itself immediately to the full fifty-year programme, but was prepared to accept the plan as outlined for the first five years and to provide the necessary finance therefor. The aim therefore now is that 365,000 acres should be afforested or replanted in the first five years of the plan’s operation.

Before attempting to discuss the import and effect of the important and indeed epoch-making suggestions contained in the Commissioners’ report of 1943, it is necessary briefly to outline the course of events which followed the presentation of the report, and to indicate what is meant by “dedication.” This term first saw the light in the report and is really the implementation of that degree of limited control, the probable national necessity for which, as has been recorded, had already been foreseen by the woodland owners themselves.

It is not known who is responsible for the application of the word “dedication” to its new and “forestal” use. The word first appears in its new connotation in para. 271 of the 1943 report, which reads as follows: “We begin with the principle that woodland which is required for timber production be ‘dedicated’ to that specific purpose and that woodland owners who so ‘dedicate’ their land, and also provide adequate assurances for subsequent good management, should receive State assistance.”

There are four main principles inherent in the act of dedication :—

- (1) The land to be dedicated must be used in all time coming for the production of timber.
- (2) The work to be done on the dedicated land and the forest crop to be grown thereon must be in accordance with an approved plan.
- (3) Skilled supervision must be employed.
- (4) Adequate accounts must be kept.

In return for the above undertakings, which, it will be observed, place a continuing burden which runs and passes with the land, binding heirs and successors equally with the purchasers if the land be sold, and thus possibly affecting its market value, certain grants will be payable by the State.

It is, of course, a fundamental principle of dedication that all owners of suitable woodlands be given the option to dedicate. Should they elect not to do so, however, their woodlands may be acquired by the State. The term "acquisition" has been defined as lease, feu, or purchase, the underlying and agreed motive being that the country can no longer afford the risk that forest land might remain sterile and unproductive.

In the late summer and autumn of 1943 appointed delegates of the Landowners' Organisations and of the Royal Forestry Societies of Scotland and England held several conferences with the Forestry Commissioners in London at their invitation. At these conferences the "principle" of dedication itself was never once disputed. It was accepted as being that "measure of control" which in the national interest was necessary and appropriate. But much and prolonged discussion did take place both on the exact definition of the "act of dedication," the amount and form of the assistance to be granted in return for dedication, the penalties for non-dedication, and on many and various matters connected with and arising from the new principle.

Resulting from these discussions the Forestry Commissioners issued their Supplementary Report (Cmd. 6500) as a White Paper in January 1944. This Supplementary Report details the adjustments made at the various preceding conferences, but it remains silent on other points raised by the delegates on which discussion was desired but not encouraged. Chief among these other points, on which the delegates desired to offer suggestions, was the all-important question of the form and manner by which forestry in Great Britain could most suitably, sympathetically, and efficiently be governed and administered in the future, both as regards State and estate woodlands. The disinclination on the part of the Commissioners to discuss constructive proposals of this nature led to the preparation and wide circulation in 1944, jointly by the Royal Scottish and Royal English Forestry Societies, of a carefully considered and documented pamphlet—which amounted in scope to an unofficial White Paper—entitled "Post-War Forestry: a Report on Forestry Policy." This pamphlet covered the whole

ground and, subdivided into eighteen sections, dealt historically and constructively with every aspect of the forestry problem. It was, in fact—as its modest foreword stated—"A contribution to an aspect of national policy which has assumed outstanding importance." It was the answer of the private forestry interests to the Commissioners' report of 1943, and as such it assumed considerable importance. Through its medium the private interests in forestry, without whose willing co-operation a successful forest policy is impossible in our country, stated their case.

The next event in the historical sequence was the passing of the Forestry Act of 1945. This was purely a "Machinery Act," reconstituting the Forestry Commission and placing the direction of forestry policy, for the first time, under direct Ministerial responsibility. The national necessity of a vital forest policy, having at long last been recognised, it was generally accepted that the time had come when its importance warranted Ministerial direction and control. Forestry was, therefore, by the Act of 1945, placed in Scotland under the Secretary of State, and in England under the Minister of Agriculture. The Forestry Commissioners, however, remain as before, appointed directly by Royal Warrant, an operative body charged with the execution of forest policy. This Act, in short, created the administrative, executive, and operative machinery without which the Government's post-war policy for forestry could not be put into effect. It did not put that policy into effect.

Consequent on the institution of Ministerial direction of forestry, certain adjustments in the qualifications for the appointment of Commissioners became necessary, Members of Parliament being no longer eligible. The form of the future administrative "set up" for forestry also took shape under the Act, and several Government and private motions on forestry were keenly debated in both Houses of Parliament. The present "set up" can be compared with the suggestions put forward by the Royal Forestry Societies as outlined earlier in this article. An entirely separate department of the Forest Authority, charged with the direction and assistance of private forestry—distinct from the State forestry programme—has not been achieved, but the new administrative scheme provides for devolution as between the three countries constituting the United Kingdom. National Committees for Scotland, England, and Wales respectively have been set up, on which serve, in addition to the Commissioners representing those countries, three members with special knowledge of matters which bear upon Forestry, such as Labour problems and Agriculture. The National Committees are supported by Regional Advisory Committees, similarly representative in their personnel of varying interests, acting in each of the conservancies into which the country has been divided. In each conservancy the conservator is responsible for the proper conduct of forestry, both State and private, but he is assisted by staff officers on both sides—i.e., officers responsible to him for the conduct of State forestry in the conservancy and others responsible for private forestry and assistance and advice thereto. On the flexibility of this arrangement and the human understanding of

the particular officers concerned in the peculiar problems which beset the private woodland owner, largely depends the success of the new administrative scheme. So far the omens are distinctly good, but future and enduring success is dependent as much on the personality of the official as on the scheme itself. At Commission level we now have the Director General of Forestry, who, until recently, has also acted as Chairman of the Commissioners, with a Deputy Director General, these high officials acting through Directors of Forestry in Scotland, England, and Wales. In March 1947 Sir Roy Robinson gave up the office of Director General, retaining his original position as Chairman of the Commissioners.

The resultant effect of the new administrative organisation, of particular interest to farmers, is that no land can in future suffer a change of use from agriculture to forestry without the approval and consent of the Secretary of State in Scotland or the Minister of Agriculture in England, acting in their dual capacities as Ministers of both agriculture and forestry. In practice, even before the Minister's approval became statutory by the Act of 1945, in Scotland at least, the Secretary of State's approval was sought by the Commissioners when acquiring land for afforestation purposes, though his consent to acquisition was not then essential. This fact does not appear to have been generally realised by the farming community.

By the passing of the Act of 1945 the stage was set and the broad outline of things to come took shape. Before, however, the principle of dedication could become a reality and not merely a principle, further legislation was necessary to give legal effect to certain aspects of that principle. In Scotland it was found necessary to provide legal right to an owner of woodlands proposing to dedicate to burden not only himself but his heirs and successors with the obligations inherent in dedication. A further short Bill—the Forestry Act, 1946—was therefore introduced to deal with this and other relevant points. This Bill only received the Royal Assent towards the end of March of this year. The increasing interest in forestry was again manifested during the passage of the Bill through Parliament by the keenness of the debates in both Houses.

It may be of interest to indicate briefly the forms and amount of assistance which the State is now prepared to extend to the landowner who elects to dedicate his woodlands. As has already been remarked, if an owner of woodlands which are considered to be suitable for dedication does not elect to enter into a Deed of Agreement to dedicate, he runs the risk of having the control of his forest areas removed from him. Owners of woodlands too small in extent to be suitable for dedication, but potentially capable of producing timber of commercial value, are eligible to receive planting grants without the obligation of dedication. This arrangement should prove an incentive to owner-occupier farmers on whose properties there is often to be found small areas of woodland, usually sadly neglected. A good farmer, proud of his ability to produce good crops from his land, should wish also to produce

good timber on any woodland he may happen to possess. In future, such small areas will attract a planting grant of £10 per acre, and technical advice and assistance will be given by Commission officers.

The owners of all estates on which there is an appreciable area of woodland, or land which has recently carried a timber crop, will be afforded the opportunity to dedicate their woodlands under one or other of the schemes known as Basis 1 and Basis 2.

If he elects to proceed under Basis 1, the Forestry Commission will repay to him 25 per cent of the approved net annual expenditure incurred by him in the planting and silvicultural maintenance of his dedicated area, according to the provisions laid down by the approved plan, until such time as his woodlands become profit-earning. This scheme has come to be known as the 25 per cent Deficiency Scheme.

If, on the other hand, the woodland owner prefers to proceed under Basis 2 he will receive £10 per acre for every acre planted in accordance with the approved plan, a maintenance grant of 3s. 4d. per acre per annum for fifteen years on every acre dedicated and thereafter planted and properly maintained, plus a grant per acre of the same amount, and, also for fifteen years, on all productive woodlands other than new plantations. Both the rates of planting and maintenance grants are subject to review after five years, in the light of ascertained costs. In addition, and under either Basis 1 or 2, loans can be secured, if desired, on a long-term basis at 3 per cent, repayment being by equal instalments annually.

In return for the assistance to be afforded to the dedicating owner under either Basis, the owner must, of course, undertake to work to an approved plan. This plan sets out in some detail the essential silvicultural operations to be performed by him in each successive year. Such operations include planting, thinning, and felling. In addition to the essential operations, as laid down in the plan, the owner must ensure that all other cultural and maintenance work necessary to ensure the health of his forest crop is performed in accordance with the rules of good silviculture.

As originally conceived and as set forth in the White Paper of 1943, the financial provisions under the Dedication Scheme did not go beyond Basis 1 or the 25 per cent Deficiency Scheme. It was on the direct representation of the owners' representatives, in conference with the Commissioners, that the Planting plus Maintenance Grants Scheme was eventually accepted as an alternative. The amount of the respective grants at that time offered and accepted in principle only by the owners, as they were not considered sufficiently ample to attract dedication, were for planting £7, 10s. per acre and for maintenance 2s. 6d. per acre. The rise in wage rates and the all-round increase in oncosts and overheads since that date have been reflected in an increase in the grants, which are now £10 and 3s. 4d. respectively.

Generally, and as far as can be ascertained at present, the woodland owners of Scotland accept the principle of dedication. They agree that the necessity of the case demands that timber-

producing areas on their estates must, after the devastation of war, be planted and maintained. That is necessary in the interests of the country. They would rather do this work themselves as free agents and without any form of restriction or control, but in most cases that is not economically possible. It is too early yet to anticipate results. The scheme, in fact, has hardly started, and the exact form of the Deed of Agreement to dedicate is as yet unknown. Every owner of woodlands other than the proprietor of a small wood will, in due course, receive an invitation to dedicate. It is certainly to be hoped that the majority will respond.

Nevertheless, there are certain considerations which make a decision difficult: considerations which, while they directly affect dedication, are yet outside the agreed principle. The incidence of taxation, the lack of housing for foresters, and the apparent unwillingness of the Government to facilitate the building of new houses or the improvement of old can be mentioned. Here the position is analogous to that in agriculture. If you do not possess the houses required to accommodate the staff necessary to carry out the approved plan, and you cannot build new houses, how can you enter into a Dedication Agreement? There is also to-day an enormous shortage of young forest trees. But the most important consideration is that of price, more especially the price obtainable for the intermediate product rather than that obtainable for the final crop. By "intermediate product" is meant the thinnings, in the form of smaller and larger poles, which must, from time to time in the life-history of the plantation, be removed if the final crop of mature trees is to reach its due proportion in volume—in other words, if the wood is to produce a good crop. These thinning operations are a necessary process in the practice of sound silviculture, and being so it is reasonable to assume that the product should command a price which at least covers the cost of removal, conversion, and transport to the consumer, plus a small profit. The position in 1917 is that the price obtainable for home-grown pit-props—and mining timber is the usual outlet for the intermediate products in forestry—is at least 75 per cent below the cost to the country of the imported article of similar grade. Price has always been the bugbear of the British timber growers. In the writer's opinion, price is the crucial factor, and on price ultimately depends the success or failure of British forests, at least so far as the private forests are concerned. Mature timber, if well grown and of good quality, will always command a reasonable figure. It is the price of the intermediate but inescapable product in the process of growing good timber which may adversely affect the issue of dedication. The farmer has been successful in achieving guaranteed prices for his production, adjusted periodically to such level as will show a reasonable profit in relation to the costs of production. The forester, on the other hand, worked right through the war on a price schedule fixed by agreement at a level only very slightly higher than the prices—which in any case were barely economic—ruling before the war. It was only at the beginning of this year that, after protracted negotiations, a slight increase in

the war-time price schedule was achieved. That increase, however, is not commensurate with the general increase in wages, overheads, and costs payable to-day. The argument that the woodland owner should be content under dedication to accept a price for his thinnings which does not compensate him adequately for his costs in felling and marketing—an operation which he is bound to perform under the approved plan—because he receives a planting grant is scarcely logical or equitable, having regard to the extreme shortage and the clamant demand for the material he is under agreement to produce. An agricultural analogy is the Ploughing Grant.

To make the picture complete to date, and in an endeavour to sketch the outline of the future, it is necessary to dwell shortly on the controversial—especially to agriculturists—subject of the three million acres of bare land which must ultimately be turned over to timber production to complete the five-million-acre programme which has now been accepted in principle.

This is an aspect of "the to-morrow" of forestry which it is necessary to approach without bias—an exceedingly difficult line of approach, it is admitted, more especially for the hill farmer. But it is necessary, whatever one's particular interest may be, to take a balanced and impartial view. It seems to the writer that there are two fundamental considerations which must be given due weight in a rational approach to this problem. These basic considerations are: (1) the proved necessity of increasing the national timber stock, and (2) the effect of an increased afforestation programme on population. The first consideration we must admit as proved. Two wars have provided the proof, and the Forestry Commissioners' recommendations in their report of 1943 are built up on a proved case. All that has followed has been consequential on proof. The country has decided—and rightly decided—that it must provide itself with more timber by growing it. Land has therefore to be found to provide for that growth.

It is here that the second basic consideration, that of population, comes in, being incidental to an increased area under trees, and of the utmost importance to the country as a whole, because it is the upland areas of the country that are most suited to, and most capable of, a heavy production of coniferous timber. It is coniferous timber or softwoods that the country most needs. The change of use of hill land from the breeding of sheep and a few cattle to the growing of a crop of trees immediately calls for increased man-power, not only for the period of planting and establishing the forest crop, but right through the rotation. Gradually, as the forest areas increase up to the target of acreage set, so will the necessary workers become anchored to the land in healthy surroundings and with a man's job to do. The ratio of man-power required as between hill farming and forestry used to be given as one man per 1000 acres for farming, and one man per 100 acres for forestry. The rate of growth in many of our woodlands, especially in the West Highlands, is, however, proving to be so rapid and the necessity for early and often repeated thinnings so clamant that experienced

foresters in these areas are already convinced that at least two men per 100 acres will be required to ensure the proper silvicultural management of the crop, apart from the exploitation thereof.

Gradual but progressive depopulation of the Highlands has been going on for roughly two centuries, and more recently our attention has been drawn to a similar attack of creeping paralysis in the hill country of the Borders. Fundamentally, any particular type of countryside can only support economically a population in direct relation numerically to the quality and productive capacity of the land which it contains. When the native population of that countryside finds that it cannot sustain the standard of life demanded by those who live and work in a richer and more productive area, or in one where industries only indirectly connected with the land provide employment, that population drifts off, first probably to a richer agricultural area, but eventually to the great cities. That is what has happened in the Highlands and is happening to-day in the Borders. The introduction of the Sheep Walk system of farming into the Highlands failed to arrest depopulation. The forests created between the wars are already stabilising the drift away from home of the native population, by providing healthy work at or near home. There is ample evidence of this. These forests are reaching, or have reached, the stage of intermediate production, and more labour than is presently available in the remote areas is already required. The difficulty to-day is the provision of houses to accommodate the necessary staff. In areas afforested, or in process of being afforested, the population pendulum is beginning to swing in the right direction. It has been static or swinging the wrong way for centuries. The first sod of the first forest village was recently cut in Dumfriesshire. That is an important and significant fact.

The diversion of land from stock-raising to timber production naturally involves a certain loss in the national output of food and wool, and this induces adverse comment and sometimes heated controversy. There is a yardstick, however, by which we should assess any particular case, and that yardstick is productivity and population.

Timber is as necessary to the nation's economy and well-being as is food. Timber costs more and takes more shipping space to carry across the oceans of the world to our shores than does an equal value of material in the form of food. We possess, especially in Scotland, upland areas of large extent, the capacity of which for the production of food is low and in many cases diminishing. These same areas are capable of a remarkably high production in timber. Under agriculture these areas employ few men. Under a forest crop production per acre, in terms of value to the nation, is greater and the number of men required to ensure that production is considerably more.

It is true that in the inter-war period adverse criticism was aroused, probably justly, by the diversion from farming to forestry of very large areas of land in single blocks. It is equally true that in forestry large blocks of land can be managed more economically

than a number of smaller and possibly scattered areas. The ideal at which we should aim and which should be possible of achievement, now that the same Minister of the Crown is responsible both for agriculture and forestry, is the proper and natural integration of both farming and forestry on a given area of land—the use of each particular piece of land for the purpose for which it is naturally most fitted.

In considering this question of the proper use of land, the statement is often rather wildly made that only those areas incapable of supporting a sheep stock, with special emphasis on deer forests, should be used for growing trees. Perhaps it is necessary to point out that a commercial crop of timber cannot be grown on just any old land ! Altitude and exposure, as well as soil conditions, are limiting factors to the successful growth of a forest crop. One more point deserves notice. When the forests become productive many industries depending on the use of timber and its by-products will grow up. Here again the population aspect ultimately will be affected. It has been reckoned that five million established acres of forest will require 50,000 men for their cultivation, exploitation and management, and 200,000 men will become engaged in industries dependent on and ancillary to the use and conversion of the timber crop. If this estimate of eventual employment in forestry and industries contingent on forestry is correct, and our Government holds without deviation to the plan which the nation has approved, at the same time appreciating with sympathy and adequate encouragement the part in that plan allotted to the owner of private woodlands, then indeed we may look ahead with hope to the future. Not only will we thus ensure to ourselves, for the first time in history, that reserve of an essential product of the soil which we must have, but in the process of achieving that assurance we will, in part at least, resolve the pressing and hitherto insoluble problem of rural depopulation.

TUBERCULOSIS ERADICATION.

By J. B. DOUGLAS, C.B.E., Barstibly, Castle Douglas.

FOR many years past Scottish dairy farmers have been making steady progress in the eradication of tuberculosis from their herds, and, though much still remains to be done, they have established a striking lead over the rest of the United Kingdom and have reaped a substantial reward for their enterprise. In the year ending 31st December 1946 producers in the area of the Scottish Milk Marketing Board received the sum of £1,423,000 in premiums for certified and T.T. milk. That imposing total takes no account of the increased value of the dairy stock which a certificate of attestation confers or for the benefits which accrue from increased freedom from disease.

The inception of the Milk Marketing Scheme in 1934 found a few T.T. herds in existence, and their owners were able to obtain from buyers some premiums for a certain quantity of milk; in certain cases for all of it. It was not till September 1937 that the first move was made officially, and the Board was directed to pay a premium of 2d. per gallon on T.T. milk sold in bulk. From October 1938 the premiums were increased and split up so as to give a real impetus to the business of eradication. These divisions consisted of certified, attested, and or T.T. and Standard, the latter designation calling only for certain conditions as to buildings and dairy hygiene.

Since 1st October 1943 the rates of premium in force have been and are 4d. per gallon for attested and T.T. milk and 1½d. for Standard milk. It will be seen, therefore, that, quite apart from considerations of public health and the increased liquid demand which may be expected to spring from public confidence in the quality of the supply, there are substantial inducements to adopt a progressive policy and that the enterprise will be amply rewarded in better financial returns. Moreover, there may well come a time when the difference between graded and ungraded milk will simply be a price disparity, with the lower quality heavily penalised.

Scotland has a long way to go before the ideal of a national free area can be realised, but the fact that she is far ahead of the rest of the country constitutes a farming asset of the utmost value.

Within the Scottish Milk Marketing Scheme there were in September 1939 only 565 producers holding certified or T.T. licences out of a total of 8000 or thereby; this figure had risen to 1460 in October 1939, and at the end of 1946 it had reached 4010 or fully 50 per cent of the whole. In England, with something like 150,000 herds, the comparable figure is in the region of 10,000.

If we take the total cattle in Scotland and England, the comparison is still very much in our favour, with the Scottish percentage of attested standing at 27·27 against 7·5 per cent for England and Wales. The Welsh percentage taken by itself is very creditable at 21·30, so clearly the smaller countries have made by far the greatest progress.

A study of our figures, county by county, shows a wide disparity; enterprise has been far more striking in the traditional dairying counties and most rapid where the family farm predominates—Ayrshire with 1650 producers has 1359 or 82 per cent licensed to produce T.T. milk, and this is surpassed only by the Island of Bute, a relatively small producer in respect of both herds and volume, with 87 per cent. Dumfries has 76 per cent and Kirkcudbright 71 per cent, while Wigtown, with the largest herds of all, lags behind at 48 per cent. Lanark, the only county other than Ayr with more than 1000 producers, has 53 per cent.

It might have been expected that those counties in the East and South-East of Scotland which are developing milk production would have shown some striking advance since new producers generally buy T.T. stock, but figures belie that expectation, for Roxburgh, Selkirk, and Berwick, with about 30 per cent each, and East Lothian with 24 per cent, obviously have a long way to go. It looks as though new entrants to the industry had not been sufficient to counter-balance those producers of long standing who have not yet set about the business seriously. A notable exception is the county of Peebles, now standing at 64 per cent.

In the north-east, Angus leads with 10·35 per cent attested, and Aberdeen is a long way behind. Production is developing rapidly in these areas, however, and considerable improvement is likely before very long. Indeed, it is safe to say that by the time these figures are in print it is probable that the over-all percentage of T.T. cattle will have advanced considerably, but it would be unsafe to prophesy where the greatest advance will be made.

It is obvious that the ultimate aim should be to get the whole bovine stock of Scotland clear of tuberculosis. We lead in the export trade, notably in the beef breeds, and a national clean certificate would be a very valuable added asset. With that aim in view a block of counties contiguous to one another and at an advanced stage of eradication must be the starting-point. It is therefore fairly certain that the south-west counties of Scotland will be chosen when the time comes, and they have the added advantage that they produce a substantial proportion of the total milk supply. Wales has a similar area in Merioneth, Cardigan, Caermarthen, and Pembroke, which, with about 50 per cent clear, would form a suitable nucleus.

Such a policy raises at once the question, in a very acute form, of the herds which have still to be cleared. Courage and vision will be necessary and some measure of hardship must ensue. If we apply the rule of the greatest good for the greatest number the case is unanswerable, and it may well be that seeming hardship will prove an ultimate blessing.

In these areas the breeding and raising of store cattle on marginal land is an important business and one which should not be lightly abandoned. It is likely, however, that such breeders would gain by being included in an eradication policy. As plans develop there will undoubtedly be a growing demand for T.T. cattle of all kinds, and as the need develops breeders in the free areas will find themselves in a very strong position with an active demand for both store and breeding stock from areas in process of being cleared.

There remains the really difficult question of those milk producers who are tenants and whose premises are not suitable for the production of graded milk. Few landlords are in a position to face the necessary expenditure, and it may as well be admitted that few tenants have sufficient vision to make it worth their while. A co-operative effort for improvements would often be mutually advantageous, but old suspicions die hard. The local authority will not issue licences where premises are unsuitable, and the producer can only recoup himself directly for the cost of clearing his herds from premiums on milk sold. Here are all the elements of deadlock which have held up progress in certain areas. It seems more than possible that the provisions of the Agriculture Act may provide a remedy. The modernisation of buildings is in the national interest; it is a permanent improvement within the meaning of the Act, and one for which a tenant might reasonably be assured of compensation at way-going. Higher authority would probably take that view.

The present administration of milk and dairy regulations is under constant criticism. It is undertaken by County Councils under the over-all direction of the Ministry of Health, and inevitably the standard of application varies greatly between areas. Great injustices can follow; a producer with quite reasonably good premises may be denied the receipt of milk premiums on the grounds that his premises do not comply, while in another area where less strict views are taken a producer with premises much less satisfactory may get a licence and with it the right to draw premiums. One hesitates to recommend any course which would abstract power from local authorities and centralise it in a Government department, but measures to impose uniformity are imperative.

Many producers fail to see the problem in its proper dimensions, and are unduly deterred by the undoubted capital commitments because they underestimate the financial return. Even where the degree of infection is found to be high, it is not difficult to demonstrate that a satisfactory dividend will accrue in the shape of quality premiums. If we assume a herd of 50 head and a sale of 600 gallons per head per annum, with a T.T. premium of 4d. per gallon, there will be a gross increase in takings of £10 per head or £500 per annum over the whole herd.

That is not the end of the matter. The stock costs no more to feed and to labour; the capital value judged by any standard is considerably enhanced, while surplus stock makes much higher prices. If the present milk policy continues, as it assuredly will,

and the campaign for eradication is intensified, as it should be if we are not to lose our status as a stock-breeding country, then the market for T.T. stock will be maintained for many years to come. It may well be that prices will fall from their present high levels; in that event the value of untested stock will fall more steeply and the disparity between one class and the other will be maintained and perhaps widened. It seems obvious, therefore, that it will be the part of wisdom for every owner of a milk-producing herd to become T.T. at the earliest possible date, and equally obvious that beef producers, especially in areas likely to be scheduled as free, should join in the movement and start preparing forthwith.

It may be useful to outline in general terms the procedure which must be followed. The initial move is for the herd owner to have his herd tested by a qualified veterinary surgeon, and this test must include all cattle of every age on the holding. Should he be exceptionally fortunate and have no reactors the test must be repeated at an interval of sixty days, and if again there are no reactors a free test is taken by the veterinary surgeons in the employ of the Minister of Agriculture after a further lapse of sixty days, and should this confirm the previous two tests a licence will be granted, subject to certain conditions as to the fencing of adjoining land being met. It should be noted that the essential preliminary is two clear tests, and that, on the average holding, is seldom attained at the first attempt. A single reactor means starting all over again, and for this reason the herd owner should not be satisfied with an animal which just scrapes through the official qualification when the reaction is measured. Eradication is an expensive business at best, and it is sheer folly to risk keeping an animal which may give trouble later, and so cause the whole cycle of testing to be begun afresh, thus delaying the granting of a certificate and the receipt of premiums.

Those who start to clear a herd to-day have an advantage over the pioneers, who had to use a test which was far from infallible and which changed from time to time as veterinary science progressed. This doubtless inflicted severe financial hardships in some cases and induced a degree of scepticism which retarded enterprise. The test to-day is more than reasonably reliable, and there need be few misgivings on that score. Once the number of reactors in the stock is established the policy can be shaped. It will generally be found that young stock wintered out shows a very slight degree of infection, and where calves are reared in airy and well-lit buildings there is seldom any trouble, for infection occurs after birth and not before.

Experience shows that infection spreads rapidly in the byre through the close juxtaposition of affected and unaffected animals. Even segregation to different parts of the same building does little to halt its spread, and leads to the belief commonly held that it is air-borne in confined spaces.

Thus a policy of "thorough" once the situation is revealed has everything to recommend it. If there is an infection rate of 50 per cent or more it will almost certainly be the best plan to sell all

the cows and restock with tested heifers. This implies a high degree of financial heroism, but it will pay dividends. Moreover, it is often found that in cases such as this the best milking cows react, leaving the inferior cattle to form the nucleus of the future herd.

If the infection incidence should be less than 50 per cent, it is generally advisable to make the best of it; remove all reactors and carry on. In any event very stringent sanitary measures have to be taken throughout all buildings housing the stock when any reactors at all are found and before a fresh start is made. Stalls, troughs, bindings, floors, walls, and roofs must be thoroughly disinfected, and every part in close contact with the animals should be gone over thoroughly with a blow-lamp. This must be done in no casual fashion; it cannot be delegated to an oddman; it should either be done personally or carefully supervised. To risk anything here is to risk everything. After that is done it is all to the good if the buildings can be left free of stock for a time.

Manure from infected premises should not be spread on pastures, but should be put on land under crop. If this is not feasible, then it should be put on land to be cut for hay. If possible, such land should not be used for grazing until it has had several months' exposure to the sun. It has been proved that in naturally infected dung the bacilli can remain alive and active for four months in winter and at least two months in summer.

Once a free herd is established, it is a consoling fact that further cases of reaction occur only very rarely, and that generally within a year of getting a clear test. It goes to prove conclusively that a single reactor can do untold harm and reinforces the case for removal on the instant. Even so, it is always good policy to rear and keep young stock on sound lines, wintered out if possible, but if in-wintered, be sure the buildings have plenty of light and that all woodwork is carefully disinfected annually. Even the youngest calf suffers little harm from dry cold, but a dark, close, badly ventilated building has nothing to recommend it, however warm.

It should be obvious that a self-contained stock should be the aim. To run a flying stock is to multiply risks many-fold, no matter how many precautions are taken. It is a wise policy, therefore, to retain each year rather more than enough heifer calves to maintain the herd two years later, to obviate the necessity of making purchases in the open market to replace any unexpected casualty. It is true that T.T. stock can be bought, but any incomer to a herd may bring the germs of contagious abortion, even though the legal obligations as to the licence are fully met.

It is necessary to correct a false impression commonly held by the public, and all too commonly disseminated by zealots, as to what is termed "safe milk," &c. There is no reliable information as to the number of dairy cattle which can be truly termed reactors. The calm assumption that only the cows which have passed the test are free from tuberculosis is clearly nonsense and is not founded on any reliable data. It is quite certain that large numbers of herds would, if tested, show very few reactors, and fresh experiences

year by year will testify to the truth of that statement. Equally it is too commonly assumed that all cows which react produce milk infected with the germs of tuberculosis. That also is far from being true. Reliable tests have shown that not more than 2 per cent of reacting cows secrete tubercle bacilli in their milk.

It is true, however, that we lag behind, much too far behind, many other countries in the eradication of tuberculosis from our dairy herds. In the great milk-producing States of America the percentage of reactors is nominal at 0.5 per cent, and over large parts of Canada the same can be said, and the public there do get 100 per cent tubercle-free milk, even though pasteurisation is general in large centres of population as it is here.

It is fairly certain that there never was the same degree of infection in the first instance, and perhaps this fact in itself permitted a far more thorough-going system of eradication than is possible here even now. From an early stage in the campaign all reactors were branded and had to be slaughtered, with the Government providing compensation at the rate of two-thirds of commercial value; on the other hand, producers get no special premiums for T.T. milk. If you want to produce milk, it must be of that grade or you go out of business.

The policy of slaughter is obviously the quick if hard road to a clean bill of bovine health, but it was unfortunately not possible in this country where in pre-war days the percentage of proved T.T. stock was small; now that progress is being made our milk supply is so short of public need that any sharp contraction in the number of our milking cattle is unthinkable. Even so, it cannot be denied that the free sale of reacting cattle without let or hindrance, unbranded and unidentified, throughout the country, has done untold harm, and has intensified the difficulties which face us when matters are carried to an ultimate issue. As a first step it should be obligatory for all reacting cattle to be branded so that buyers would be protected. As a further step it might be possible to guide them into areas where the milk output is largely manufactured.

Great progress has been made in Scotland, and the time is now ripe for another long step forward. Public opinion demands a grading up of the quality of milk offered for sale, and the first requirement is that it should be produced by cows which have passed the tuberculin test and are retested at suitable intervals by qualified officials. All enlightened dairy farmers realise that an expanding consumption must depend on the confidence of consumers in the product offered; thus the stage is set for bolder measures, applied first of all to selected areas and then gradually extended to the whole country.

INSECT AND OTHER PESTS OF 1946.

By A. E. CAMERON, M.A., D.Sc., F.R.S.E.,
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INTRODUCTION.

CONTRARY to expectations Leather-jackets again proved destructive to pasture and cereal crops in 1946, and, if wet autumnal weather is related to outbreaks of this pest in spring and summer, farmers should be prepared to take counter measures against its attacks in 1947. Judging by recent experiments, there is evidence that the application of "Gammexane" to infested fields is satisfactory in the control of both Leather-jackets and Wireworms.

Another insect which assumed prominence in 1946 was the Mangold Fly. In late May there were signs that the sugar-beet crop was likely to suffer considerable damage throughout the East of Scotland from Angus to the Lothians. Fortunately, the crop, favoured by improved growing conditions in June, was able to outstrip the infestation, and the second generation of the fly was defeated by the persistent cold and rainy weather of July and August.

In answer to the demand for greater food production in recent years many farmers have so modified their rotations as to grow one and the same white crop in succession for two and three years, with the result that certain cereal pests have become more common than usual. Two examples are the Gout Fly of barley and wheat, and the Frit Fly of oats. In Scotland, the reduction in yields due to these pests is generally insignificant especially in strong tillering varieties, which contrive to make a substantial recovery from slight attacks.

In last year's 'Transactions' reference was made to the occurrence of the Oat Root Eelworm on Scottish farms. In 1946 further cases were encountered in the Lothians, in which there was undoubted evidence that severe infestations develop only where oats or other susceptible cereals, such as barley and wheat, are grown in close succession.

Among pests of cruciferous crops, outbreaks of the Diamond-back Moth are marked by their irregular periodicity. After an interval of four years, when it reached a low ebb, a slight infestation was recorded in 1945 and repeated on a larger scale in 1946. Young cabbage plants were severely damaged by the pest in July. In 1946, too, there was an increase in the numbers of the Turnip

Flea Beetle, and where control measures had been neglected resowing of the turnip crop was not uncommon.

Of forest insect pests submitted for identification and comment in 1946, perhaps the most interesting was the Lymexylonid beetle, *Hylecætus dermestoides*, which attacks sickly trees and green, felled timber of many hardwoods and conifers. It was found in a larch plantation at Dunkeld in October 1946.

A co-operative piece of research on Scottish Biting Midges which was begun in 1945 was continued in 1946, when an investigation of their breeding habits and a survey of those attacking man were made in Peeblesshire and the Trossachs.

It is interesting to report that, as a result of extensive trials by entomologists and others in various countries, a more accurate picture of the practical application of D.D.T. and "Gammexane" in the control of agricultural and horticultural insect pests is emerging. Meanwhile two further chlorinated hydrocarbons have appeared, one of which is "Velsicol 1068." Its insecticidal properties are said to be similar to those of D.D.T. and "Gammexane," and its residual effects intermediate between the two. The other is D.D. (a mixture of 1, 2-dichloropropylene and 1, 2-dichloropropane), which is claimed to be an effective controlling agent of Root Eelworms and Wireworms in glasshouse soil.

Among the insect pests mentioned in this introduction, those that have been selected for further discussion are Biting Midges, Gout Fly, Frit Fly, Diamond-back Moth, and the wood-boring *Hylecætus dermestoides*.

SCOTTISH BLOOD-SUCKING MIDGES.

In 1945, with the support of the Department of Health for Scotland, an investigation into the distribution, habits, and economic importance of the blood-sucking midges of Scotland was undertaken by a team of entomologists drawn from the four Scottish Universities. As the result of a survey of midges made in various parts of the country a few species hitherto unrecorded in Scotland were added to the Scottish list, but even more important was the fact which emerged that those which are noxious to man and livestock are comparatively few, possibly not more than four—namely, *Culicoides impunctatus*, the predominant midge of the Highlands; *C. obsoletus*, a suburban and rural species; *C. heliophilus*, fairly common on swampy moors; and *C. pulicaris*, around farms and farm buildings. So far popular names have not been assigned to any of these species, and for lack of better *C. impunctatus* may be properly termed the Highland Midge, *C. obsoletus* the Urban or Garden Midge, *C. heliophilus* the Swamp Midge, and *C. pulicaris* the Farm Midge. It may be that with further knowledge of their habits these names may require to be modified.

In 1946, with renewal of the support of the Department of Health, the midge investigation was continued from May to October, when the Entomological Department of Edinburgh University

undertook to make the following contributions to the common effort :—

- (1) A survey and analysis of the midge population of the Trossachs during July to September.
- (2) Determination of midge breeding places by the use of box traps, which had given promising results in 1945. These traps, specially devised for the purpose, were kept in operation from May to October.
- (3) Estimation of the density of larval midge populations by extraction of soil samples taken from breeding sites previously located by box traps.
- (4) Experiments in midge control by the use of repellents and insecticides.

Midge Population Survey.—The Trossachs district was chosen as a suitable locality for the survey, chiefly because it supports a large midge population and also because it is a popular tourist resort. The method of the survey consisted in making a large series of collections of man-biting midges, which were subsequently examined and the species identified and counted. Eight sites were selected for midge collecting, and were distributed throughout the district from Brig o' Turk to Loch Katrine. It was the aim of the survey to provide a more accurate fund of knowledge of the proportions of the components of a local midge population than could be obtained by the more general survey made by the members of the investigating team in 1945.¹

To acquire the necessary collections of midges the collectors exposed themselves to attack for periods of thirty minutes at a time, and midges which settled to bite on accessible parts of the head and limbs were captured and preserved for future diagnosis. Where two persons were engaged in the operation and provided mutual assistance in the process of collecting, the rate of capture and likewise the number of specimens taken in the stipulated time greatly exceeded the catch made by a lone collector. It will be appreciated that as the blood-sucking habit in midges is confined to the females, the data in Table I. refer only to this sex.

In all, forty-one collections were made in the open from 5th July to 7th September, and when due allowance is made for the unfavourable weather conditions and the short season over which collecting was done, the results obtained may be considered as roughly reflecting the composition of the population of anthropophagous midges at the Trossachs during the summer. Altogether, a grand total of 6000 specimens was taken and examined belonging to seven different species, of which *C. impunctatus* (Fig. 10, A.) accounted for 95·75 per cent; *C. pallidicornis*, 2·14; and *C. obsoletus*, 1·98. The contribution of the remaining four species was but a tenth of 1 per cent. It is not claimed that the figures give an exact picture of the relative proportions and activities of the

¹ Cameron, A. E., Downes, J. A., Morison, G. D., and Peacock, A. D. (1946). Interim Report on Control of Midges. II. A Survey of Scottish Midges. Department of Health for Scotland. Edinburgh: H.M.S.O.

TABLE I.
CAPTURES OF MAN-ATTACKING (ANTHROPHAGOUS) MIDGES, TROSSACHS, JULY TO SEPTEMBER 1946.

Species	Sites and Number of Collections at Each								Total	Number of Collections at Sites of Species	Frequency of Occurrence of Species	Percentage	Biting Activity
	T ₁	T ₂	T ₃	T ₄	T ₅	T ₆	T ₇	T ₈					
<i>C. fuscipennis</i>	10	7	5	5	3	5	4	2	2	5	1		Late afternoon.
<i>C. heliophilus</i>			1			2			3	17	3		Diurnal and nocturnal.
<i>C. impunctatus</i>	1371	468	966	519	242	1075	644	390	5675	41	41	95.75	Evening, rarely diurnal.
<i>C. obsolatus</i>	62	17	6	3	2	25	1	1	117	41	16	1.98	Mainly evening.
<i>C. edibilis</i>					1				1	3	1		
<i>C. pallidicornis</i>	7	32	13	3		55	16	1	127	38	12	2.14	
<i>C. pulicaris</i>	1								1	10	1		
Totals per site	1441	518	986	525	245	1158	661	392	5926				
Average per collection	144.1	74.0	197.2	105.0	81.7	231.6	165.2	196.0	144.5				

species in a full season, since the investigation at the Trossachs commenced at least two months later than the appearance of the earliest midges and ended about a month before the last disappeared. Nevertheless *C. impunctatus* maintained a high level of infestation through the collecting period and proved the most noxious of the man-attacking midges in the Trossachs. Again, not only was it a torment at any hour of the day under overcast, warm, and humid conditions, but it continued to annoy campers asleep under canvas throughout the night.

From the fact that *C. impunctatus* was uniformly distributed in all the localities where collections were made, the conclusion may be safely drawn that conditions favourable for its breeding extend widely throughout the Trossachs, and the same applied in a lesser degree to *C. obsoletus* and *C. pallidicornis*. So far as *C. obsoletus* is concerned, this is a species which occurs more frequently in and around the gardens of urban centres, but its rarity in our Trossachs collections may also have been partly due to the fact that the first generation of this apparently two-brooded species had come and gone before our collecting commenced, and that the few specimens obtained were stragglers of this generation or sparse representatives of a partial second generation.

In basing conclusions on collections of biting midges captured on human beings, it should not be forgotten that certain species attack animals as well as man. Thus *C. impunctatus* and *C. obsoletus* freely bite cattle, and *C. heliophilus* sheep and dogs. At present for particular kinds of midges there is very little knowledge of their host preferences, and *C. pulicaris*, which is frequently referred to in literature as biting man, was encountered but once on man in our Trossachs collections. From the fact that *C. pulicaris* commonly occurs on farms in Scotland, it would seem that it is probably more attracted to livestock than to man. In this regard, *C. pallidicornis*, which was recorded attacking human beings both at the Trossachs and in Peeblesshire, possibly finds its main source of food in birds.

Midge Breeding in Nature.—In last year's article in the 'Transactions' reference was made (p. 103) to our limited knowledge of the breeding habits of biting midges and the desirability of enlarging it. A trial experiment was therefore undertaken in 1945 at Drumelzier, Peeblesshire, with a view to recovering midges emerging from likely natural breeding sites covered by box traps. Thus six species were bred in traps in the open between July and October, and these included *C. impunctatus* and *C. obsoletus*, which are of prime importance to the human population. The remainder consisted of the apparently lesser important human species—*C. pallidicornis*, *C. pulicaris*, *C. delta*, and *C. cunctans*—none of which are to be compared in ferocity with *C. impunctatus* and *C. obsoletus*.

On the basis of this 1945 experiment and in view of the fact that an accurate knowledge of the preferred midge-breeding grounds was essential to any campaign of direct control of the pests, it was decided to extend the experiment in 1946 to include two further localities—namely, Roslin, seven miles south of Edinburgh,

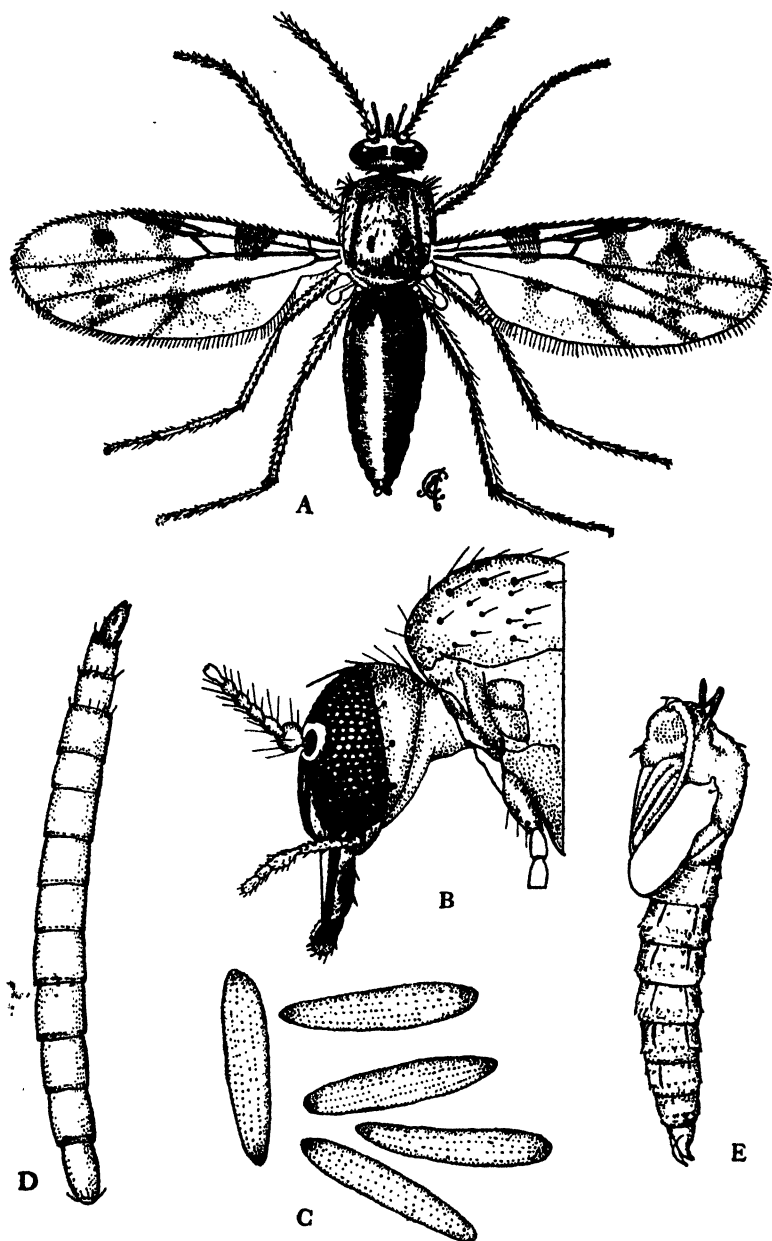


Fig. 10.—Stages of the Life-cycle of *Culicoides impunctatus*. (Original.) A. Female. $\times 22$. Common midge pest of the Scottish Highlands. B. Head of female in profile. $\times 80$. The mouth-parts for piercing skin and drawing blood are shown. Antenna is incomplete. C. Eggs. $\times 70$. They are laid in water-logged peaty soil in summer after the female has acquired and digested a blood meal. They hatch in a few days. D. Larva. $\times 20$. Emerges from the egg and develops in the soil during autumn, winter, and spring, pupating in early summer. E. Pupa. $\times 20$. Lasts from ten to fourteen days. It has two small breathing horns in front. Finally, the pupal skin splits along the back and the adult midge escapes and takes flight.

and the Trossachs. Appreciating the importance of continuing the breeding experiments throughout a complete midge-active season, we placed the traps in position at Drumelzier and Roslin on 9th May, and maintained them there until the end of September and beginning of October. At the Trossachs, circumstances made it impossible to begin the experiment in breeding until 19th July, and it was prematurely terminated on 14th September. In all, twelve traps were kept in operation, of which seven were exposed at Drumelzier, two at Roslin, and three at the Trossachs.

The trap (Fig. 11) used was one of simple design, which the author had previously found useful in the study of the Pear Thrips, *Tæniothrips inconsequens*, on Vancouver Island.¹ It is constructed of three-quarter inch timber, has the form of an open box covering

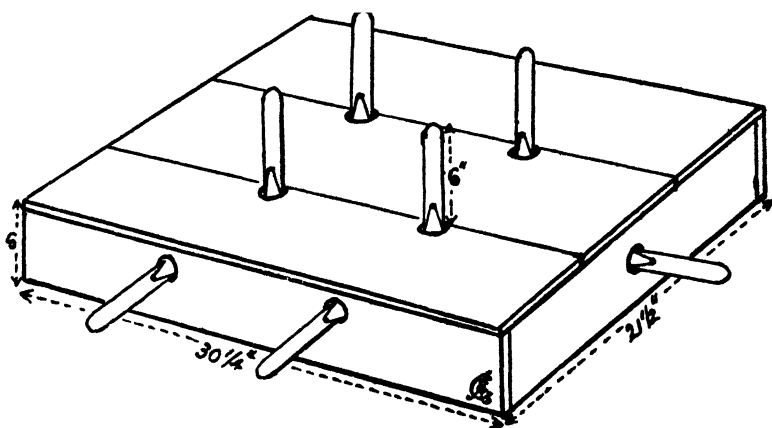


Fig. 11.—Edinburgh Midge Box Trap. (Original.) The trap is used for ascertaining breeding sites of terrestrial blood-sucking midges. Midges and other soil insects emerging from the soil covered by the trap are attracted to the light and enter the glass vials. Their return to the dark interior of the trap is prevented by the celluloid cone with which each vial is equipped.

an area of four square feet, and with an internal capacity of two cubic feet. The trap is set firmly on the ground, open side downwards. In the inverted floor four equally spaced holes are drilled, each just large enough to take a six-inch glass vial of one-inch diameter. The vial is inserted into the hole by its open end for a distance equal to the thickness of the timber, and the mouth of the vial is fitted with a metal or celluloid funnel, the smaller apical aperture of which has a diameter of five mm., and is directed inside the tube. Two further similar vials projecting horizontally were fitted to each of the longer, and one to each of the shorter sides of the trap. Additional vials could be fitted, but in practice ten proved sufficient for the purpose. Indeed, the vertical tubes were

¹ Cameron, A. E., and Troherne, R. G. (1918). 'The Pear Thrips and its Control in British Columbia.' Bulletin No. 15, Entom. Branch, Dept. Agr., Canada.

decidedly less productive of captive midges than the horizontal ones.

It should be noted that the traps were non-selective of insects except as regards size, and yielded a rich sample of many sundry arthropod members of the soil- and surface-fauna. Among insects captured in the vials other than biting midges, there was an assortment of spring-tails, stone flies, may flies, cuckoo spits, jumping plant lice (*Livia juncorum*), a wealth of beetles, numerous parasitic hymenoptera of different families, an extensive range of flies (Diptera), including many non-biting midges and crane flies, and even a few bird fleas. Arachnids were chiefly represented by spiders, which seemed to prey particularly upon male specimens of biting midges captured in the vials. Here they spun webs in which the captive insects became enmeshed and were difficult to disentangle when the vials were emptied each week and the catch was subsequently examined and analysed.

The results of the midge-breeding experiments in nature are condensed in Table II. The index letters heading the columns—namely, D₁ to D₇, R₁ and R₂, and T₁ to T₃—designate the different sites randomly selected on which the traps were exposed at Drumelzier, Roslin, and the Trossachs respectively. Those at Drumelzier were set on water-logged peat, loam, or gravel soil in the open on a moor, except D₁, which was placed on the floor of a mixed Scots pine-alder wood. At Roslin, R₁ was on a garden compost heap, and R₂ at the bottom of a deep gorge covered by dead leaves. At the Trossachs, T₁ and T₂ were on swampy open ground, whilst T₃ was on relatively dry bracken-covered ground near the bank of a small stream. Since the weather of the 1946 summer and autumn was almost continuously wet, none of the sites suffered from drought, and at Drumelzier D₁ and D₇ were subject to flooding, which may explain their almost negative character. D₃, likewise unproductive, was the driest of all the Drumelzier sites.

By reference to Table II. the following general features of the breeding experiments will be observed:—

- (1) Eight species of biting midges were bred from soil.
- (2) Four species—*C. heliophilus*, *C. obsoletus*, *C. pallidicornis*, and *C. pulicaris*—were bred in the traps in appreciable numbers.
- (3) *C. heliophilus* and *C. pallidicornis* prefer water-logged soil in which to breed.
- (4) *C. obsoletus* has a preference for decaying vegetable matter for breeding, but also breeds in swampy soil.
- (5) *C. pulicaris* seems to be equally partial to water-logged soil and decaying vegetable matter.
- (6) The breeding preferences of *C. impunctatus* have not been fully decided, although it can be stated on the evidence presented that it *does* breed in water-logged soil.

The reason for the relatively low numbers of *C. impunctatus* may be ascribed to the exposure of the traps on non-preferential sites. Evidently none of those tested at Drumelzier, where *C.*

TABLE II. MIDGES REARED IN BOX TRAPS, DRUMELZIER, ROSLIN, AND TROSSACHS, 1946.

Species	Drumelzier														Roslin		Trossachs						Total Species			
	9th May-4th Oct., 140 days														11th May-28th Sept., 140 days	28th July-28th Sept., 62 days	19th July-14th Sept., 57 days									
	D ₁		D ₂		D ₃		D ₄		D ₅		D ₆		D ₇		R ₁		R ₂		T ₁		T ₂		T ₃			
	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀ + ♂	
<i>C. chiopterus</i> .																									3	3
<i>C. cunctans</i> .												3													1	1
<i>C. fascigennis</i> .																									1	1
<i>C. heliophilus</i> .																										
<i>C. impunctatus</i> .																										
<i>C. obsoletus</i> .																										
<i>C. pallidicornis</i> .																										
<i>C. pulicaris</i> *																										
Totals of each sex .	2	40	24	1	25	28	10	5	109	93	1					108	14	1	1	14	8	9	1	8	327	175
Totals of both sexes		64		1	53	15	202		1						122		2			22	10		8		502	502

* In the group *C. pulicaris* there is included the doubtful *C. delta*.

impunctatus occurs, could have been suitable. It is possible that, judging from the great density of its numbers in the vicinity of Scottish lochs like Lubnaig, Awe, and Katrine, of which we have personal experience, it may be found to breed in the damp soil at loch- and perhaps pond-margins. Recent work by Hill¹ would appear to support this argument. In any case, it is apparent that there is considerable scope for further work on the important problem of midge-breeding by the method of box-trapping described above.

Density of Numbers of Terrestrial Midge Larvæ.—Since the box-trap method had served to demonstrate the soil-breeding habit of several kinds of biting midges, it seemed worth while to carry the investigation a stage further and make a rough estimation of the numbers of their larvæ at the Drumelzier sites, on which traps for the capture of adults were exposed. At the same time it was realised that counts of the larvæ would be prejudiced by our inability in the present state of knowledge to differentiate those of biting and non-biting midges, both of which were shown by trap-rearing to occur together in one and the same site. Therefore, the figures given below in Table III. have reference to a mixed population of both kinds, in which the percentage of either cannot be stated, much less the individual species.

TABLE III. EXTRACTION OF CULICOIDES LARVÆ FROM SOIL SAMPLES, DRUMELZIER, 1946.

Date	Site	Sample 8" × 8"	Depth of Sample	Numbers per Quarter Sample				Total
				I.	II.	III.	IV.	
9.9.46 .	D1	D1	4"	0	0	0	0	0
21.8.46 .	D2	2	4"	7	17	4	60	88
9.9.46 .	D3	3	4"	0	0	0	0	0
3.8.46 .	D4	4	4"	8	..*	..	..	8
10.8.46 .	D4	5	4"	1	0	0	0	1
21.8.46 .	D5	6	4"	4	6	8	0	18
3.8.46 .	D6	7	4"	20	25	10	47	102
10.8.46 .	D6	8	4"	8	5	8	32	53
9.9.46 .	D6	9	0 — 1½"	9	13	..	..	59
			1½" — 3"	23	5	..	..
			3" — 4½"	9	0	..	..
			4"	140	89	..	..
9.9.46 .	D7	10	4"	73	36	69	43	229
16.9.46 .	D7	11	4"	52	46	24	61	221
13.10.46	D7	12	4"	23†	10	20	10	183
13.10.46	D7†	13	4"					63

* Blanks indicate quarter samples not extracted.

† Moisture content of sample 83.24 per cent.

‡ Number per half of a quarter sample.

For the purpose of making the counts, soil samples 8 inches square and 4 inches deep were lifted and their insect inhabitants

¹ Hill, M. A. (1946). "Biting Midges." 'Discovery,' Vol. VII., No. 7, pp. 200-203.

isolated by flotation in a solution of magnesium sulphate of 1.18 sp. gr., after the samples had first been disintegrated by jet-washing with a solution of the same concentration in a "Hollick" apparatus.¹ In all, thirteen samples were examined, and the numbers of midge larvæ were found to range from 0 to 229 per sample, with a mean average of 90. This represents a midge population of about 9 millions per acre, all of which, for the reasons stated above, may not be members of biting species. It should not, however, be concluded from the statement of this round figure per acre that midge breeding occurs uniformly throughout an area. On the contrary, breeding sites may be scattered here and there, their distribution depending on conditions which have not so far been defined, except that an abundance of moisture and decaying organic matter of vegetable origin would appear to be essential to soil-breeding midges.

There is another consideration which concerns our tentative estimate of the density of the midge population based on larval counts in soil samples. Actually the vertical distribution of midge larvæ is not confined to the first 4 inches of soil. In individual samples they were found to occur at slightly greater depths, so that our average mean number of larvæ per sample is certainly less than the actual, and to this extent affects the magnitude of our round figure of midges per acre.

Midge Control.—The field of control will require to be extensively explored before there may be any prospect of even a partial solution to the midge problem.

A. Repellents.—In the meanwhile progress has been made in the perfecting of measures for the protection of the individual by the use of repellent D.M.P. skin creams, one of which was introduced by the Scottish Midge Sub-Committee in 1945 and noted in last year's 'Transactions' (p. 108). The formula of this cream was first published in the Sub-Committee's Interim Report, already referred to on page 67, and used by manufacturing chemists in the compounding of anti-midge preparations that were widely sold last year to the general public.

As the result of further investigation in 1946, the Sub-Committee² has produced another repellent cream that varies slightly from the previous one in its formulation and possesses greater stability and improved cosmetic qualities. The important feature about repellent creams is that to be effective they should contain not less than 40 per cent of the active ingredient, dimethyl phthalate.

The alternative to repellent creams in lending protection against midge attack are veils worn over exposed parts of the body and impregnated with D.D.T. Their pattern is identical to that successfully used by British army forces in mosquito-infested battle zones abroad in the late war. The material of which they are made

¹ Salt, G., and Hollick, F. S. J. (1944). 'Studies of Wireworm Populations.' *Ann. App. Biol.*, Vol. XXXI., No. 1, p. 54.

² Cameron, A. E., Downes, J. A., Morison, G. D., and Peacock, A. D. (1947). *Second Interim Report on Control of Midges*. Department of Health for Scotland. Edinburgh: H.M.S.O. (*In Press*.)

consists of a green rot-proof netting with an open mesh $\frac{1}{8}$ inch by $\frac{1}{8}$ inch, which, in the form of a sac-like veil drawn over the head, allows for easy ventilation and impedes neither respiration nor vision. Worn only when circumstances demand, the veil remains effective for five to six days, but this period may be prolonged to ten to twenty days by keeping the veil in a flat two-ounce tin in the intervals between use. The addition to the storage tin of a small damping pad moistened weekly with D.M.P. serves to extend further the duration of its efficacy. Veils similar to the head veil and shaped to the limbs may also be worn if necessary, but their use under British conditions does not seem essential except in special circumstances, as, for instance, the protection of lightly clothed hikers.

Meanwhile it is possible that as tests are multiplied materials other than D.M.P. will be found with even more pronounced midge-repellent properties, and to investigators in this field of research there is no lack of chemical compounds with which to experiment.

Direct Control.—But when all is said and done, repellents, it must be appreciated, do not destroy midges, and therefore do not offer a solution to the problem of control, which must rest on an enlargement of our knowledge of their breeding habits and treatment of terrestrial and other breeding sites with insecticides lethal to larval and adult midges. This line of investigation has been tentatively explored by Hill (*loc. cit.*), who treated with "Gammexane" and D.D.T. a known breeding site of *C. impunctatus* at Knowsley Park, Liverpool, with promising results.¹ Because of the scattered distribution of midge-breeding places over large expanses of territory, the most that may be expected of direct methods of control would amount to nothing more than local relief from infestation of tourist centres and villages. Even this would be a valuable gain to the residents in such places provided there was assurance that the local midge "vacuum" artificially created would persist through the active season, and would not be destroyed by invasion of the pests from adjoining sources of breeding. In this regard it is essential that accurate information be acquired concerning the range of midge flight before it can be decided what extent of a breeding area in the neighbourhood of a centre of population would require to be treated to give the degree of protection desired. It is the common opinion, based on observation, that midges do not voluntarily migrate far from the places where they breed, but, on the other hand, there is no reason to doubt that, like other small, winged insects such as greenfly, they may drift before the wind for long distances.

Last year at the Trossachs a small experiment on the eradica-

¹ Sometime after the present article had gone to Press, two substantial contributions to the British midge problem were published in May, namely:—

Hill, M. A. (1947). "The Life-cycle and Habits of *Culicoides impunctatus* Goet. and *Culicoides obsoletus* Meig., together with some observations on the Life-cycle of *Culicoides odibilis* Aust., *Culicoides pallidicornis* Kief., *Culicoides cubitalis* Edw., and *Culicoides chiopterus* Meig." *Ann. Trop. Med. and Parasit.*, Vol. 41, No. 1, pp. 53-115.

Hill, M. A., and Roberts, E. W. (1947). "An Investigation into the Effects of 'Gammexane' on the Larvæ, Pupæ, and Adults of *Culicoides impunctatus* Goet. and on the Adults of *Culicoides obsoletus* Meig." *Ibid.*, pp. 143-163.

tion of midges troublesome in tents at a camping site was made. For the test combustible "Gammexane" smoke generators were employed and proved effective. In a disinfested tent opened and examined after the smoke inside had settled, midges, chiefly *C. impunctatus*, which were thick on the walls before the operation was carried out, were found to have been totally destroyed along with the other insects in the tent. The residual effect of the "Gammexane" film-deposit, which remained on the walls of the tent, appeared to be innocuous to fresh midge invaders, which later entered and settled. Clegs, however, soon reacted after settling and shortly succumbed. That "Gammexane" dust is toxic to midges was later demonstrated by confining midges in a tube the inner wall of which had been previously coated with a film of the dust, and so it was concluded that whilst the deposit of "Gammexane" on the tent wall was apparently adequate for the destruction of clegs it was not so for the more minute midges. The difference of effect on the two may have been associated in some way with the texture of the cotton fabric of the tent, permitting of a more intimate contact of the feet of the cleg than those of the midge with the deposited "Gammexane."

The idea of smoke generators suggests a fruitful field of investigation in midge control, not only indoors, in barns and stables, where midges tend to collect attracted by cattle and horses, but also in the open, where they rest in large numbers in coarse grassy vegetation during the day.

THE GOUT FLY (*Chlorops pumilionis*).

The size of an insect pest is no criterion of the degree of damage of which it is capable, and diminutiveness is often more than counterbalanced by numbers. The Gout Fly provides an example of this general principle. Whilst experience would show that this insect is not usually a serious pest in Scotland, yet it is always present, and there is evidence that during the late war it became more prominent in the eastern districts of the country, a fact that may be correlated with the more frequent introduction in rotations of the cereal crops which it attacks. By comparison with conditions on English farms, and particularly those from Yorkshire south, it would seem that the incidence of Gout Fly in Scotland is smaller than that prevailing in England. Nevertheless its potentiality for damage to barley, wheat, and rye is such that farmers on this side of the Border cannot afford to neglect it, and should at least make themselves familiar with the "gout" symptoms by which infestations are diagnosed. Appreciation of the damage which a pest may cause is a necessary preliminary to the practice of its control.

Life-history.—To begin with, it should be understood that there are two generations¹ of the Gout Fly (Fig. 12) per year—namely,

¹ Where an insect has more than one generation per year, entomologists often refer loosely to the adult as representing the first stage of a generation and not, as is proper, the last. A generation begins with the egg (in some species the larva or nymph) laid by the adult female of the previous generation.

(1) the first or summer generation, which infests spring-sown crops, such as barley and wheat, and matures in July and August; (2) the second or autumn-winter generation, which infests winter barley and wheat, and matures in May when the adults appear. This generation also has couch-grass for a winter host as well as volunteer barley and wheat.

As regards the *first generation*, Gout Fly activity begins in May, when the flies that have developed from the second or overwintering generation (1) appear on the wing and proceed to lay eggs (2) on the leaves of spring-sown barley and wheat. The plants have now become well established with stems of two or three internodes and ears enclosed by the sheathing leaves. Each female fly lays about 150 eggs, one per shoot, on the upper side of the leaves.

In about a week the eggs hatch, and the maggot creeps down the leaf to the stem (3), into which it bores and damages the developing ear by cutting a groove (4) down one side as far as the internode below. The result is that further growth of the stem is inhibited, and whilst the ear continues to expand it remains unshot. The ensheathing leaves, too, become enlarged so that the affected part assumes a swollen or "gouty" appearance (3). By July the yellowish-white maggot (4), which is the cause of the damage, has grown to a length of about $\frac{1}{4}$ inch and, if one exposes the ear, the maggot may be found in the groove it has made. In severe infestations as much as 20 per cent of the ears may be destroyed.

Before pupating the full-grown maggot makes its way along the groove to the base of the ear, and there transforms to a pupa (4) within a yellowish-brown pupa case. About a month later, in August and September, the adult flies emerge and pass to winter barley, wheat, and couch-grass (5, 6), in which the *second generation* spends the winter as a maggot. The latter burrows down to the base of its host plant with the onset of colder weather, and remains dormant till spring, when it completes its growth and pupates in April, the flies emerging in May.

Because of the seasonal differences in the condition of growth of the host plants at the time they become infested (September and June), symptoms of Gout Fly attack in winter barley and wheat by the second generation of the fly are unlike those shown by the spring crops attacked by the first generation. In the autumn the plants are small and stemless when infestation occurs, and the maggot feeds inside the central shoot, which is destroyed. Damaged plants remain stunted, become swollen at the base, and do not develop an ear-bearing stem (5). This is in marked contrast to the spring crops, in which the stem has usually grown to include two or three internodes when the flies appear, and "gout" occurs higher up at the level of the developing ear (3), as described above. In the one case ears do not develop; in the other they develop but are seriously damaged.

Control.—Like many other insect pests of field crops, the Gout Fly does not lend itself to control measures once the crop is infested. It is well known, however, that the more advanced is the growth of the spring crop when the flies appear in June, the less the risk

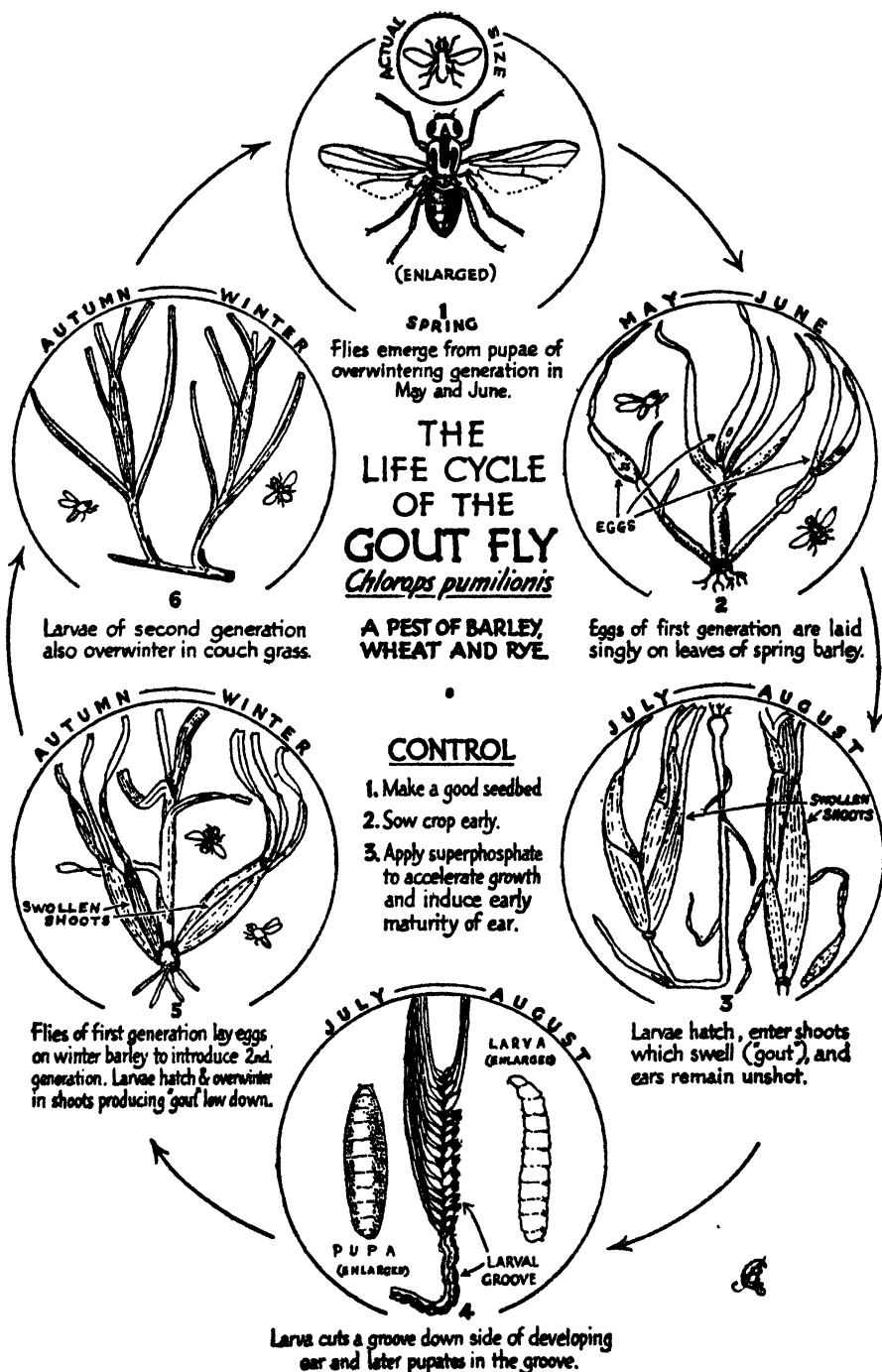


Fig. 12.—*Chlorops pumilionis*. Gout Fly. (Original.)

of damage. Plants most liable to injury are those in which the leaves, used by the flies for egg-laying, arise from the stem at the level of the unshot ear. Consequently, maggots hatching from such eggs and migrating downwards to the stem cannot fail to strike and damage the ear. In plants, again, in which the developing ear overtops the leaves, maggots hatching from eggs laid thereon enter the stem below the ear, which thus escapes. It is therefore evident that early sowing should be practised in spring, the seed sown in a bed of good tilth, and a dressing of superphosphate applied to accelerate the growth of the ear-bearing internode.

As regards winter crops, it is advisable that sowing should be postponed until such time as the autumn brood of flies has disappeared, and eradication of couch-grass, an important winter weed-host of the Gout Fly, cannot be too strongly emphasised.

Frit Fly (*Oscinella frit*).

Unlike the Gout Fly, the Frit Fly (Fig. 13), which is a member of the same family of flies (*Oscinidæ*), is chiefly a pest of spring-sown oats, but it also attacks autumn-sown wheat and barley after a ryegrass ley. In its general proportions the Frit Fly (1) is not unlike the Gout Fly, but is more inconspicuously coloured. Its uniformly blackish appearance contrasts with the pale-yellowish colour of the Gout Fly (Fig. 12), in which there is a dark spot on the crown of the head, three dark bands on the upper side of the thorax, whilst the hind body is greenish-black. Like the Gout Fly, the Frit Fly spends the winter as a maggot in couch-grass, also in ryegrass, sheep's fescue, and in autumn-sown wheat and barley. In contrast to the Gout Fly, which has two annual generations, the Frit Fly produces three as follows:—

- (1) The first or early summer generation, which breeds in the shoots of spring oats and is the most destructive.
- (2) The second or late summer generation, which breeds in the developing grain of the oat panicle.
- (3) The third or over-wintering generation, which, like the first, infests the shoots of its host plants.

Life-history.—In the month of May there appear the flies (1) that are the product of the over-wintering or third generation, and these proceed to lay the eggs (2) of the first generation on the upper side of the lower blades of the young plants of spring oats. In a matter of four days a small maggot hatches from the egg, and boring into the shoot makes its way to the growing point (3), where the flow of sap is richest. This it destroys, with the result that the apical leaf withers and dies (2), whilst the others remain green and healthy. The withering of the apical leaf is not in itself diagnostic of Frit Fly attack, since it may arise from other causes, but confirmation of the condition may be readily obtained on dissection by the recovery of a yellowish-white maggot, about $\frac{1}{2}$ inch long, in the interior of the shoot, or perhaps a slightly smaller yellowish-

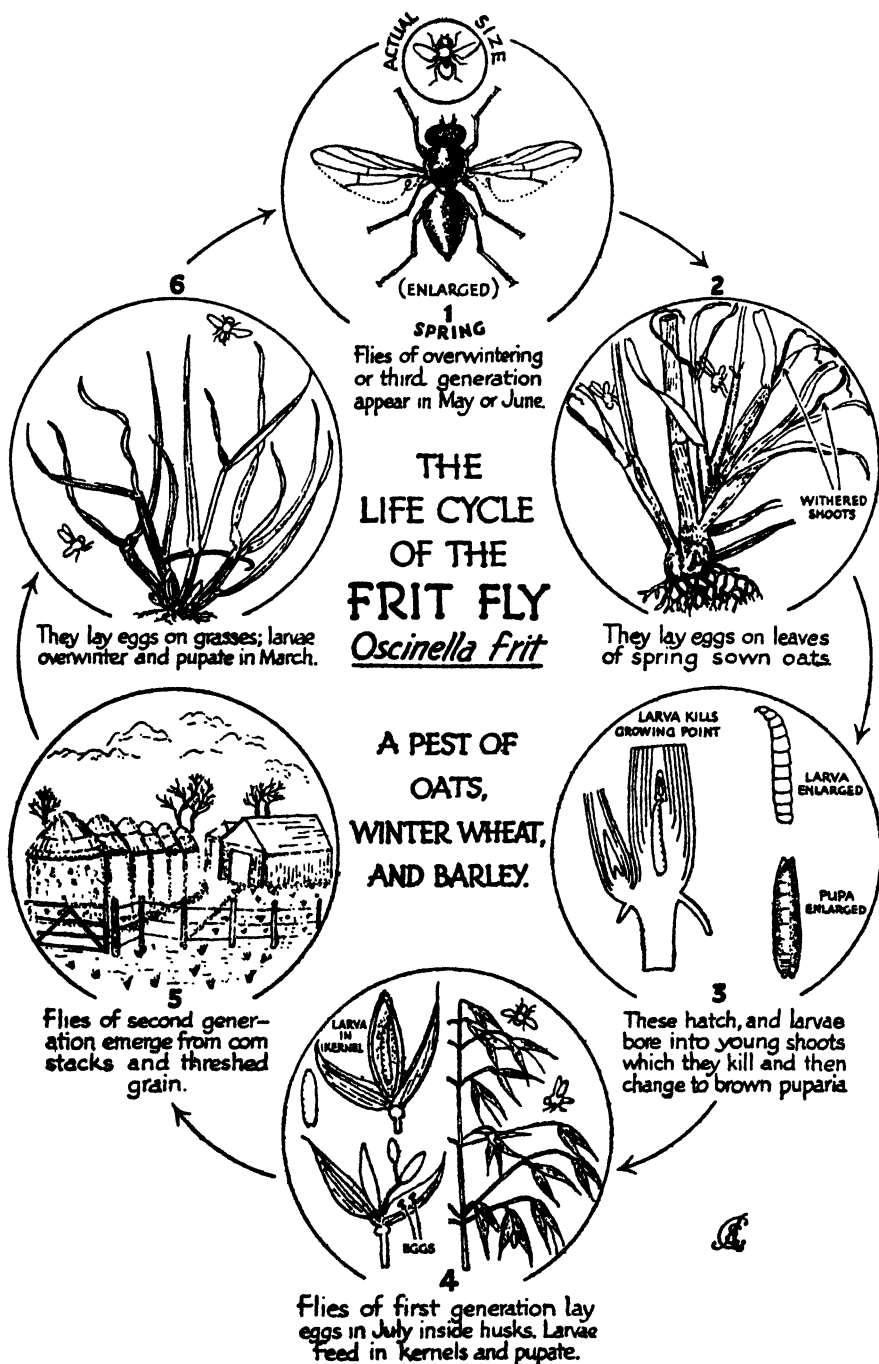


Fig. 13.—*Oscinella frit*. Frit Fly. (Original.)

brown puparium (3), into which the maggot transforms towards the middle or end of June. From these puparia there emerge in July the flies, which by laying eggs introduce the second generation.

Whereas the eggs of the first generation are laid on the leaves, those of the *second generation* are deposited on the inside of the husks (4), whence the maggots on hatching bore into and destroy the kernel of the grain (4). In due course the maggots pupate, and at harvest the puparia are found in the ears, whence they are transported with the sheaves to the stackyard (5). In August and September flies emerge from the puparia in the stacks, and likewise from such as have been dislodged from the grain and left behind in the oat fields.

The final or *third generation* appears when the flies of the second lay their eggs in late summer on the leaves of grasses (6) such as couch, rye, and fescue. The development of the third generation resembles that of the first, in that the maggot bores into the growing shoots of its host plants. Then with the approach of winter the maggot hibernates, but resumes feeding in spring and pupates in April or May, when the adult flies appear to lay eggs on spring oats, and so complete the round of three generations.

Control.—The crops which are most prone to damage by Frit Fly are winter corn and spring oats.

Infestation of winter corn occurs when the crop follows a ryegrass ley already infested by the maggots of the third or overwintering generation of the Frit Fly. After the ley has been ploughed, the maggots continue to subsist on the undecayed grass until such time as the corn has braided, when they migrate to the shoots of the young plants. The damage makes itself evident in January and February, when the crop assumes a thinned appearance. Winter corn, therefore, should only be sown after ryegrass when the field has been ploughed before harvest time.

So far as spring oats are concerned the crux of the problem of control lies in the decreasing susceptibility to attack of the crop with growth. Thus previous to the four-leaf stage oat plants are highly susceptible, but later they become more resistant. The aim of the farmer, therefore, should be to advance growth to the four-leaf stage before the middle of May, when the flies of the overwintering generation appear and lay their eggs. This may be achieved by sowing spring oats early in a good seed-bed and applying a light top dressing of nitrogenous manure to the soil, which should also have an adequate content of phosphates and potash.

Needless to say, there is no direct method by which an infestation of Frit Fly in a crop can be reduced once it has begun, and therefore recourse must be had to precautionary measures for protection of the crop against attack, such as have been outlined above.

DIAMOND-BACK MOTH (*Plutella maculipennis*).

Outbreaks of the Diamond-back Moth (Fig. 14) are periodic in their appearance, and there is a suspicion that they may be asso-

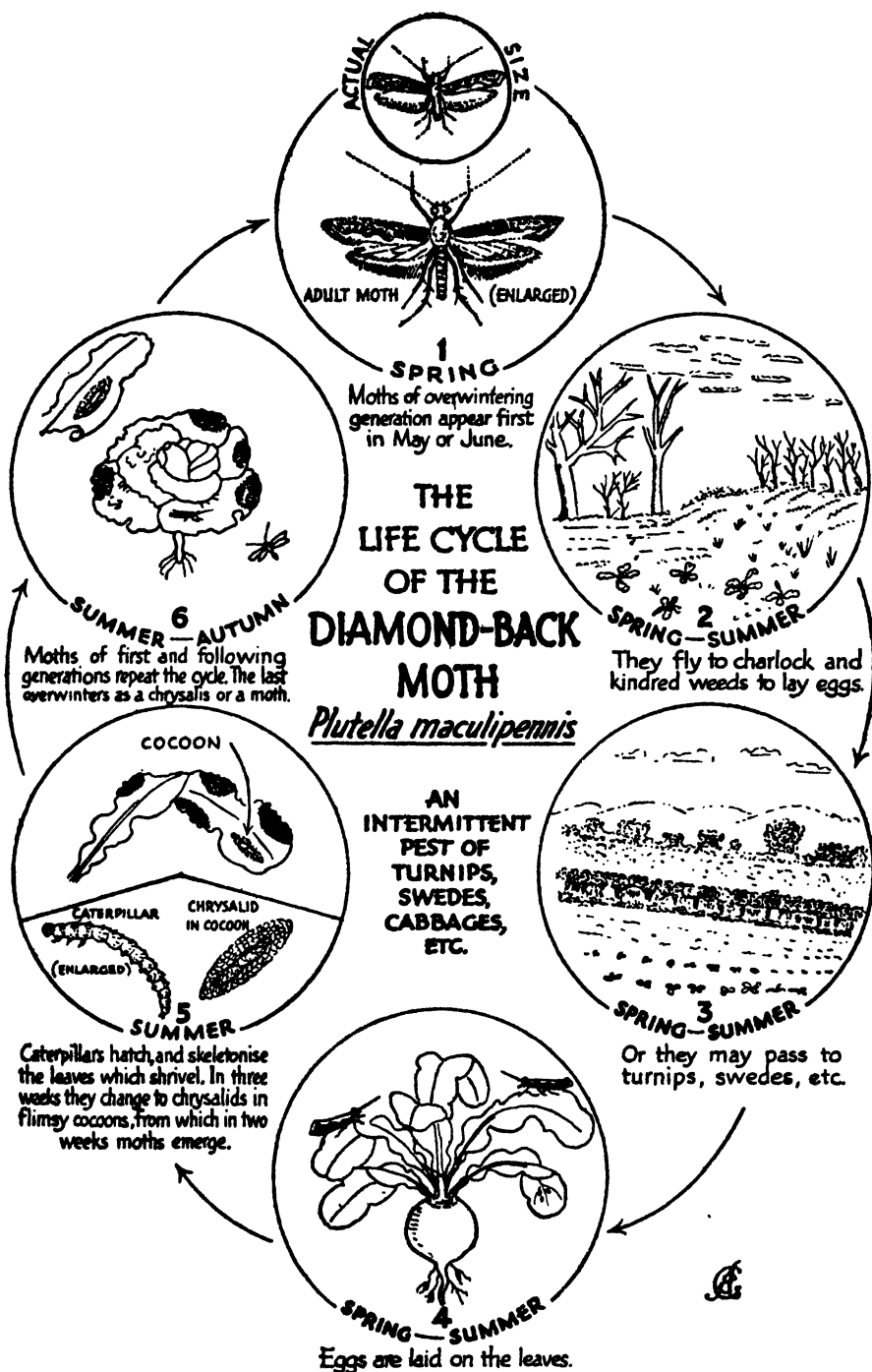


Fig. 14.—*Plutella maculipennis*. Diamond-back Moth. (Original.)

ciated with invasions of this insect, a well-known migratory species, from the continent. This idea is strengthened by its coastwise distribution in Britain. Our experience of the pest has been limited to its activities in South-east Scotland, where infestations were recorded in 1935, 1941, 1945, and 1946. The counties chiefly concerned were Midlothian, East Lothian, Berwick, and Roxburgh.

Life-history.—In the course of a year there are at least two and possibly three generations of the moth, which hibernates either as a chrysalis in a cocoon or perhaps as an adult tucked away in any convenient sheltering crevice.

The *moth* (1) first appears in turnip and cabbage fields in May and June, and is found resting on the under side of the leaves of its host plants, whence it readily takes flight at the slightest disturbance. The moth is of small dimensions, about $\frac{1}{2}$ inch in length with wings folded on each side of its body. The general colour is brown and grey. On the hind margin of each of the forewings there are three yellowish-white marks so arranged that when the wings are apposed in the position of rest, they form a diamond-like pattern, from which the moth derives its popular name.

Moths that appear from hibernation in spring proceed to lay their greenish-yellow eggs of the first generation on the lower surface of the leaves of available cruciferous weeds, like charlock and hedge mustard (2), whilst later females oviposit on Brassicas (3, 4).

The caterpillars (5) on hatching first mine the leaves, but later they feed openly, devouring the whole substance of the leaf except the upper skin, which turns brown and shrivels. In three weeks the caterpillar completes its feeding and spins for itself a flimsy cocoon, in which it transforms to a chrysalis (5), and two weeks later the moth emerges. Thus the first generation is completed and is followed by a *second* and, perhaps, a *third* (6). That there is a considerable overlapping of generations is indicated by the occurrence of moths every month from the middle of spring until October.

Natural Enemies.—Infestations of Diamond-back Moth are notable for the speed with which they develop, and outbreaks usually coincide with warm, dry conditions in June and July. The insect is peculiarly susceptible to wet weather, and well-established outbreaks are often quickly terminated by rainstorms. Rain is not only directly lethal to the caterpillars, but it also encourages the spread of an insecticidal fungus, *Entomophthora sphærosperma*, which infects the caterpillars.

The Diamond-back Moth is also held in check by many parasitic wasps which are present every year but become particularly abundant towards the end of an outbreak, when it may be difficult to find a caterpillar that is not parasitised.

Among insectivorous birds, lapwings and starlings are particularly useful for their good services in seeking out and devouring the caterpillars.

Control.—The key to success in controlling the Diamond-back Moth is the early discovery of the moths and caterpillars. As

soon as the first signs of damage to the foliage have been verified, steps should be taken to reduce the infestation as quickly as possible. Experience has shown that treatment with wet insecticidal sprays is not satisfactory because of the difficulty of applying them adequately to the under sides of the leaves where the caterpillars occur. Better results are obtained by the use of dusts, of which several are available, including those that contain derris, "Gam-mexane," and D.D.T. in suitable concentration. They should be applied whilst dew is still on the leaves at the rate of 40 to 50 lb. per acre, and the nozzles of the dusting machine should be adjusted so as to apply the powder to the lower side of the leaves.

Even a non-poisonous deterrent dust is useful for reducing infestations in the more mature turnip and swede crops. For its application a scuffler is used, to which there are attached "twiggy" branches, and it is so operated as to sweep along the rows and dislodge the caterpillars. At the same time ground-dust is stirred up, and, settling on the leaves, renders them distasteful to the caterpillars.

A POLYPHAGOUS WOOD-BORER (*Hylecætus dermestoides*).

The beetle, *H. dermestoides*, has been rarely recorded in Scotland, although Fergusson¹ in 1919 found it breeding in large numbers at Balquhider and Dunkeld in various hardwoods and conifers. Among wood-boring insects *H. dermestoides* (Lymexylonidae) (Fig. 15) is remarkable in that it appears to have no special host preferences, and Fergusson records it from birch, beech, gean, Spanish chestnut, larch, spruce, and Scots pine. Normally, it confines its attacks to recently felled stems and fresh, strong stumps, and does not infest standing trees unless they are moribund. In former times when oak was commonly used in shipbuilding, *Lymexylon navale*, closely akin to *H. dermestoides*, achieved considerable notoriety by boring into and damaging oaken timbers.

By way of identifying *H. dermestoides* among other wood-boring beetles, it should be noted that its larva is peculiarly shaped, and the adult male beetle has a maxillary palp which is provided with a massive fan-like process that is quite unique.

It may be that *H. dermestoides* is more common in Scotland than is realised, and in 1946 it was found in a plantation of European larch in which suppressed trees had been attacked by this species as well as by the bark-borers *Hylurgops palliatus* and *Dryocætus autographus*. The presence of these two was in itself sufficient to indicate the unhealthy condition into which the trees had fallen.

Life-history and Habits.—There is but a single generation of *H. dermestoides* per year. The winter is spent as a larva in galleries, which are driven into the wood, and the adult emerges in the spring to reinfest other suitable timbers.

The adult beetle (1) ranges in length from $\frac{1}{4}$ to $\frac{3}{4}$ inch, and resembles a Soldier Beetle of the family Cantharidæ. It is com-

¹ Fergusson, D. C. (1920). '*Hylecætus* or *Lymexylon dermestoides*,' Trans. Roy. Scot. Arbor. Soc., Vol. 34, Part 2, pp. 192-195,

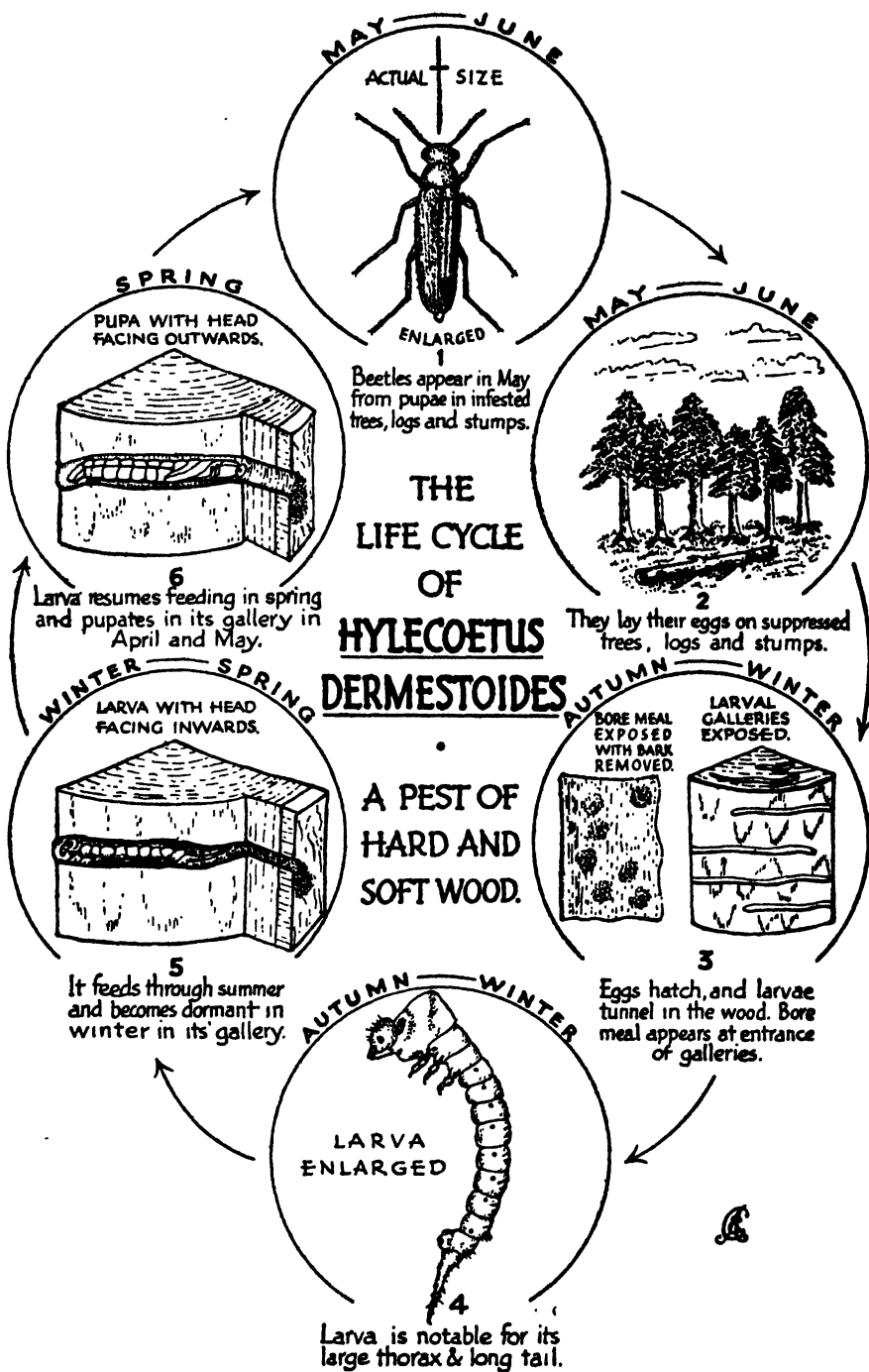


Fig. 15.—*Hylecoetus dermestoides*. A polyphagous wood-boring beetle. (Original.)

paratively soft bodied, of a reddish-brown colour, slender in form, and parallel-sided. The males are usually smaller and darker than the females.

The flight months of the beetles are May and June. The life-span of the female is no more than two to four days; of the male, it is even less. The beetles, which do not feed, occur on suppressed trees or near stumps and felled logs, and here the female lays its eggs in crevices of the bark (2) or on the cambium ring of the exposed surface of a fresh stump. In all, each female lays about 120 eggs.

The eggs are long, cylindrical, rounded at the ends, and measure about $\frac{1}{16}$ inch. Hatching occurs after ten to fourteen days, when the larva (4), in which the first body segment is unduly enlarged and the last prolonged into a tail-process, proceeds to burrow through the bark into the wood. Naturally, the entrance hole of the gallery is minute, corresponding to the small size of the first-stage larva, but as the latter continues to grow with feeding, so likewise does the diameter of the gallery increase (3). The larva literally eats its way through the wood, leaving behind in the gallery a trail of wood-dust which, by means of its tail-process, it periodically pushes back to the entrance hole. There it is ejected as bore-meal, and its daily accumulation outside is a sure sign of the presence of living larvæ within a log or stump. By stripping the bark of an infested log heaps of bore-meal may be exposed (3), compressed between the wood and bark.

In larch, the larval galleries tend to run concentrically with the annual rings of the sapwood, but in other softwoods and hardwoods they may extend to the heart. During the winter the larva remains dormant (5), but resumes feeding in the spring.

When full-grown the larva retraces its course, tail first, to the narrow initial part of the gallery, which it proceeds to enlarge, as likewise the entrance hole, so that it can now turn and present its head towards the outside. Having reversed its position the larva makes a chamber by blocking the gallery behind its body with a compacted mass of bore-meal and proceeds to pupate.

The period of larval development occupies about ten months, whilst that of the pupa (6) is merely one of about seven days. The latter lies near the entrance hole with its head directed outwards, so that when the beetle emerges from the pupal skin it can readily make its escape to the exterior by creeping through the enlarged entrance hole. Were it not for the provision for escape made by the larva previous to pupating, the beetle would remain effectively imprisoned in its gallery, since its jaws are not sufficiently powerful to bore through the wood to the outside.

There is an interesting question which concerns the mode of nutrition of *H. dermestoides*. According to Escherich,¹ who quotes Neger, there occurs a fungus (*Endomyces hyleceti*), which reacts on wood and extracts from it substances which can be digested by the larvæ. This dependence of *H. dermestoides* on a fungus for its

¹ Escherich, K. (1923). 'Die Forstinsekten Mitteleuropas,' Vol. 2, p. 174. Berlin.

food supply finds an exact parallel in certain wood-boring bark-beetles, in the galleries of which there occurs a fungus, "ambrosia," with a similar function. The mode of inoculation of fresh larval galleries of *H. dermestoides* with the all-important wood-digesting fungus has not been satisfactorily explained, but it is suggested that the egg-laying female may be the active agent of transmission.

Forest Relations.—As a primary forest pest *H. dermestoides* has very little significance since it does not affect healthy standing trees. Its status, however, with reference to green, felled stems left unbarked in the forest has quite a different complexion. These prove to be particularly susceptible to attack, and the workings of the larvæ serve considerably to depreciate the value of such stems for conversion into timber intended for constructional and other purposes.

Control.—Since *H. dermestoides* assumes greatest economic importance where felled trees are concerned, it is essential that these should be removed from the forest before the beetles appear in May and June. Alternatively, logs that are left can be protected from attack by being barked, whilst those that have perchance become infested should be destroyed in the autumn.

AGRICULTURAL RESEARCH IN SCOTLAND IN 1946.

BEING A BRIEF SUMMARY OF THE WORK AT THE
SCOTTISH AGRICULTURAL RESEARCH STATIONS
AND AGRICULTURAL AND VETERINARY COLLEGES
DURING THE YEAR.

*Readers desiring fuller information on any of the subjects mentioned
should write to the Director of the Station or Principal of the
College at which the investigation is being carried out.*

INSTITUTE OF ANIMAL GENETICS.

UNIVERSITY OF EDINBURGH, WEST MAINS ROAD.

Cattle.—The long-term experiment on the breeding of dairy cattle continues at Shothed and Cockburn on a basis of a herd of 120 dairy cows. During the war it was impossible to maintain the essential condition of uniform management; also there was difficulty in collecting and keeping the records. Owing to variation in the availability of feeding-stuffs the principle of management is to force the cows to their maximum yield. To this end three times milking has been adopted, and the byre staffs work on a two-shift system. First lactation records have now been completed and indicate that it is again possible to distinguish between the good milking cow and the really very good one. Butter-fat records are on a fortnightly basis of a sample separately analysed for each milking. An incidental use of the data is to examine the accuracy of the official milk-recording figures.

Pigs.—The main experimental work with pigs concerns the inheritance of good mothering ability. This includes litter size, milking capacity of the sow, and her temperament.

Poultry.—The genetic analysis of problems in egg production has been continued and the commercial possibilities of inbred crosses in poultry investigated further. Distribution of deaths and causes of mortality in the Institute flock of Brown Leghorns over a number of years is now in process of analysis. During the year the results of a study on factors affecting the age of sexual maturity have been published. It was found that genetic differences were not

exhibited in autumn-hatched pullets, although successively hatched spring groups indicated to a varying degree inherent tendencies in respect of maturity.

Although deaths in poultry from neoplastic growths are not unduly high in this country, in other parts of the world they are responsible for a heavy death-rate. The use of inbred lines from the Edinburgh flock in an experiment on tumour susceptibility showed clearly that inherent differences in susceptibility to cancer between lines selectively bred for purposes unrelated to the tumour problem existed in the various lines.

ANIMAL DISEASES RESEARCH ASSOCIATION.

MOREDUN INSTITUTE, GILMERTON, EDINBURGH.

The investigations upon which the Association has been engaged in recent years are being continued. These include grass sickness in horses, lactation tetany in cows, white scour and allied diseases in calves, scrapie, enzootic abortion in ewes, tick pyæmia, pining in sheep and young cattle, yellowsees, and tick-borne fever.

The systematic investigation of parturient redwater in cows is being continued, and the co-operative programme of research upon the important problem of mastitis in dairy cows is being actively pursued.

THE ROWETT RESEARCH INSTITUTE.

BUCKSBUEN, ABERDEENSHIRE.

The main lines of investigation which have been in progress during the year 1946 are as under:—

1. Further work on the utilisation of phytic acid phosphorus in cereal foods has confirmed and extended the results of previous observations on oatmeal. This work has been extended to sheep by means of a comprehensive study of the various cereals as sources of available phosphorus.

2. A preliminary general investigation has been made by the staff of the Institute on the effect of restricted diet during pregnancy on ewes and their offspring. A considerable mass of useful basic physiological information has been gained and more closely controlled work on problems of foetal and neonatal growth and hæmatology is being initiated.

3. In addition to more routine analyses for iodine, conducted on behalf of the Medical Research Council, balance experiments are being carried out to investigate the effect of varying levels of calcium intake on iodine metabolism.

4. The pyridoxine deficiency caused by excess of vitamin B₁ in a synthetic diet has been further studied in experiments with

varied intakes of Ca and vitamin B₁, and in a series of flour experiments, in which flour of varying rates of extraction was used in diets with high B₁ intake. The thymus weight of weanling rats was determined in all these experiments, since earlier work had indicated that this was markedly affected in pyridoxine deficiency.

5. A study of the effect of high- and low-plane feeding on resistance to infection in sheep has been made. In high-plane sheep a skin infection with staphylococci is more localised and more rapidly cleared of organisms than in low-plane sheep.

On the other hand, there is evidence to suggest that the low-plane sheep may be more resistant than the high-plane animals to infection with vaccinia virus.

Antitoxin formation in the high- and low-plane groups has been studied, but the experiments have so far failed to reveal a difference in the maximum levels attained by the two groups.

High-plane sheep are more often resistant than low-plane sheep to intra-dermal injection of weak toxin of *Cl. welchii* (lamb dysentery bacillus), but they react much more acutely than low-plane sheep to strong toxin.

6. An investigation into the relationship between nutrition and parasitic infestation has been initiated. Work has been in progress to establish techniques for a study of intestinal worms in this connection and to determine if there is any correlation between the faecal egg count and the worm burden disclosed when the animal is examined *post mortem*. So far, good correlation has been found between faecal egg counts and post-mortem counts of *Hæmonchus contortus*; but there has been no correlation between the worm burden and the live-weight increase of the lambs. This work will develop fully during the next year.

7. The first steps have been taken in a study of the possible effects of nutrition on a disease of sheep locally known as "strawberry foot rot." At present an attempt is being made to identify the causal agent, which appears to be a virus, and to determine if it is related to the virus of contagious pustular dermatitis. The infection has been transmitted to sheep, and the possibility of transmission to small animals is being studied.

8. A detailed microscopic analysis of the gut organisms in high- and low-plane lambs from one to ten days old has been made, but no significant qualitative difference has been found. The study has shown that in the young lamb there is greater microbial proliferation in the upper colon than the rumen. The material provides a possible starting-point for studying the detailed evolution of the gut microflora from birth to adult life; material from sheep of different ages (as it becomes available) will be added to the investigation.

Fistulas have been made into the rumen of several sheep. In these animals a study of the factors governing digestibility of different fodder-plants is being initiated. The approach will be gradual, beginning with the study of simple cellulosic substrates of defined botanical and chemical composition. Thus the influence of the various factors will be evaluated one by one in the hope that when actual fodder-plants are studied it will be possible to

explain differences in their digestibility in terms of their botanical and chemical structure.

9. A routine histology section has been set up to deal with material submitted by other workers and departments in the Institute. This section is now at work on an extensive collection of tissues from sheep and rats, and it has continued to receive fresh material.

10. The staff of the experimental farm has been engaged in investigations in co-operation with the staff of the North of Scotland College of Agriculture into—

- (a) Methods of making grass silage and the losses involved therein.
- (b) The losses sustained in storage of potatoes after haulm destruction at different times. This investigation will include the losses in transit to England and it is hoped observations on the subsequent growth of the seed tubers.
- (c) The value of different materials for weed destruction in cereal crops and their effect on under-sown grasses and clovers.
- (d) An experiment has been initiated to compare the value for breeding purposes of the produce of the Black-faced ewe crossed with (a) the Border Leicester and (b) the Wensleydale.

SCOTTISH PLANT-BREEDING STATION.

CRAIGS HOUSE, CORSTORPHINE, EDINBURGH.

Experiments on the breeding of cereals, potatoes, herbage plants, swedes, and other Brassicas are in progress at the Station. In view of the long-term character of most of the research it is customary each year to describe briefly in the 'Transactions' one section of the work, and on this occasion that concerned with herbage plants will be reviewed.

The field of herbage plant-breeding is a wide one, and it has been found necessary to confine the breeding operations within certain broadly defined limits and to concentrate on those problems, the solution of which is likely to have the greatest influence on Scottish agriculture. The hill districts of Scotland provide the opportunities for useful research, and it is with them that the herbage programme is mainly concerned.

On the outbreak of war the investigations dealing with the complementary utilisation of contrasting vegetations—i.e., cultivated and rough vegetations—were suspended, and it was not possible to continue them until the spring of 1943. The basic idea underlying these investigations is to supply animals on nutrient-deficient rough grazings with a balanced diet by utilising small areas of ploughable and relatively accessible land for the production of a herbage very rich in the nutrients most needed as

supplementary feed. For instance, the protein content of the average hill vegetation is often very low indeed, and the herbage itself is frequently indifferently grazed. The indications are that by feeding protein-rich food to stock on rough grazings the consumption of poor quality herbage is encouraged—a very significant observation. In experiments conducted on part of a hill-grazing it has been possible by intensive manurial treatment to raise the percentage of crude protein in the dry-matter of the cultivated grass to around the 30 per cent level, but such intensive treatment creates its own plant-breeding problems. Under such a system of complementary grassland farming it is probable that the pure-culture sward composed of plants of a given developmental type is better than the customary mixed sward of orthodox grazing practice; in fact, under the conditions required for the highest protein yields it is virtually impossible to achieve the correct competitive balance between species and even between varieties within species to maintain a satisfactory mixed sward. The protein production of the pure culture in contrast to that of the mixed sward is therefore receiving special attention. This work involves the isolation of suitable maturity races which reach their peak protein production at different seasons of the grazing year. Thus the aim is to provide a succession of protein-rich herbage at the times it is most wanted.

Field trials have shown perennial ryegrass to be a particularly suitable species for complementary purposes, at least where rainfall is heavy. It is, however, possible that short-lived plants such as Italian ryegrass and its hybrids may be more useful in certain circumstances. Several races of mid-season and late perennial ryegrass capable of withstanding heavy treading have proved satisfactory, but so far no early race of the desired type has been found. The search for different maturity types and in particular for early types continues, the following methods being employed: (1) formation of a bred strain by the collection of material from selected climatic regions which would provide basic breeding material; and (2) utilisation of a natural regional race through the critical biological survey of selected climatic regions with a view to locating colonial populations which are worth using as direct sources of commercial seed.

The survey of regional populations is regarded as a most promising line of research and is being undertaken in close collaboration with the National Institute of Agricultural Botany and with any Seed Growers' Associations which exist in the regions concerned. The work itself involves the study of plant type in relation to local environmental conditions, and represents a practical extension of the ecotype investigations which have been in progress at the Plant-Breeding Station for a number of years. It has been found that it does not follow that because a strain of ryegrass, for instance, originates from this or that geographic region that all the products of natural selection within that region will be of the same maturity or of the same growth type, for the selective action of the environment is seldom if ever uniform throughout a geographic region.

Hence racial certification based on the region without reference to the local populations within the region can be very misleading. Further, some colonial populations of ryegrass which have long been subjected to a particular environment comprise plants of very considerable similarity, though it often happens that their progeny show a relatively wide range of variation. It is therefore necessary to test the breeding potentialities of promising samples before arriving at a decision as to their agricultural worth. It follows that it is of great importance to practical agriculture that serious consideration should be given to the biological aspects of the problem, as it is obvious that until a scheme of certification takes into account colonial intra-regional variation, and also makes provision for the multiplication of commercial as well as stock seed, the obvious advantage of a regional race cannot be made generally available. Unless a scheme of certification takes into account the results of research into the variability of regional races, the bred strain of known type and performance will almost certainly be the more reliable product.

Since it is early types of perennial ryegrass that are most urgently required for the complementary experiments now in progress, a comprehensive collection of plants has just been made from specially chosen agronomic and climatic habitats in Devon, Cornwall, and the Scilly Isles.

THE HANNAH DAIRY RESEARCH INSTITUTE.

KIRKHILL, Ayr.

In the past year research work has been continued in the following subjects :—

Farm Self-sufficiency.—The farm has now entered the seventh year of the farm self-sufficiency programme. Investigations on the effect of fertiliser treatments on the yield and chemical composition of grass and fodder crops, which were commenced last year, were continued and expanded in the current season. In addition, with the assistance of the Soil Analysis Department of the West of Scotland Agricultural College, the effect of extreme fertiliser treatments on the soil reaction and on some manurial constituents is being studied.

The importance of carotene in animal nutrition and the important rôle of dried grass in supplying this constituent has led to a detailed study of methods of carotene analysis and to a study of the carotene contents of the experimental material mentioned above.

Grass drying remains an enterprise most suitable for the large-scale operator. In view of the importance of grass as a source of home-grown cattle food, the continuing need for self-sufficiency, and the numerical importance of the farms of medium size, preliminary trials are at present being made with a view to the design of a grass-drying apparatus of low capital cost. In this connection

pilot trials on field wilting and on cold-air drying have been carried out.

Animal Husbandry.—Observations on the design and fittings of cow byres have been continued.

Diseases of Dairy Cows.—A full review of the data collected during the last five years on all aspects of contagious mastitis has been completed, and it is hoped that this will be published during the next year. This has included the estimation of the loss of milk directly attributable to this disease both on a herd and an individual cow basis. Both methods of analysis agree that the loss is approximately 7 per cent.

Much of the time of the staff has been devoted to the treatment of mastitis with penicillin, especially in field experiments, in collaboration with other members of the Agricultural Research Council's mastitis conference.

At the request of the Agricultural Research Council, a long-term investigation into the vitamin reserves of cattle and their bearing on calf mortality has been in progress during the year. This work is carried on in co-operation with the Moredun Institute, and it is expected that a report on the year's work will soon be available for the Agricultural Research Council. In addition, the Institute is co-operating with the Ministry of Agriculture in an investigation into the causes of calf mortality.

Metabolism Experiments.—Experiments on the effect of thyroxine on lactating cows, investigations into the chemistry and metabolism of boron and on the metabolism of copper are being continued.

Further experiments have confirmed the earlier observations that thyroxine increases the percentage of fat in cow's milk without affecting the composition of the milk in any other way. It has been demonstrated that losses of protein from the cow's body during the administration of thyroxine may be prevented by increased intake of food. The effect of thyroxine on the calcium secretion of the cow has also been investigated.

A review of the recent work in Britain, America, and other parts of the world on the nutrition of ruminants has been completed.

Ruminant Digestion.—It is now recognised that digestion in the rumen is effected by bacteria. The bacterial fermentation is associated with breakdown of carbohydrate and liberation of large amounts of organic acids, carbon dioxide, and methane. To produce these substances there is proliferation of bacteria resulting in synthesis of protein and vitamins, and storage of polysaccharide. Some preliminary experiments have been done to determine the relative importance of volatile fatty acid production, protein synthesis, and polysaccharide storage.

As a result of the tests of biological value of the protein of rumen bacteria, there is further evidence for the theory that

ruminants utilise non-protein nitrogen by digesting, in the stomach proper and small intestine, protein synthesised by bacteria in the rumen. Results of this work, which was carried out in co-operation with another Institute, are now being prepared for publication.

Investigations into the carbohydrate and nitrogen requirements of the rumen bacteria are being continued.

Physiological Research.—The work on the ventilation of farm buildings has been extended and amplified in regard to one of the byres situated at the West of Scotland Agricultural College. All the work during the last two years, including that portion done specifically for the Scottish Farm Buildings Committee, is now about to be published. It has been possible to set a minimum standard for outlet and inlet ventilation for byres of certain cubic capacity and also to establish a standard method of investigating byres for their ventilating efficiency. This work is proceeding further and will be expanded to study many different types of ventilating systems.

The Bacteriology of Milk and Milk Products.—The investigation of the value of rapid tests for the detection of milk of poor keeping quality at the creamery receiving platform which was begun at one centre last summer has been extended. This year work has been carried on at four centres during the summer months, and the results obtained over the two years period are now being subjected to statistical analysis.

The results of the co-operative experiment to determine the effect of the pre-heating temperature of the liquid milk on the quality of dried milk have now been published.

The work on the relation of the survival of bacteria in dried milks to the relative humidity of the atmosphere in which the milk is stored continues.

In co-operation with the Genetics Department of Glasgow University, work has been begun on the production of mutants of micro-organisms suitable for use in the microbiological assay of amino acids.

The Keeping Quality of Dried Milk.—An experiment, to find out to what extent the storage life of a spray-dried whole milk powder can be lengthened by adding a small amount of ethyl gallate as an anti-oxidant to low and high temperature pre-heated milks, has been completed. The results show that raising the pre-heating temperature from 160° to 190° F. or the addition of 0.07 per cent ethyl gallate to the milk improved the keeping quality of the resulting powder, as measured by taste, by a factor of the order of 3-4 at room temperature. With a high pre-heating temperature, plus the incorporation of ethyl gallate, a powder of excellent keeping quality is obtained, and by this method it may be possible to eliminate gas-packing.

The large-scale experiment begun in June 1945, in collaboration with the National Institute for Research in Dairying, Reading, and

the Low Temperature Research Station, Cambridge, to investigate the deterioration and loss of nutritive value on storage of dried skim milk, with special reference to the influence of moisture content, has now progressed sufficiently to enable a preliminary note to be published.

THE MACAULAY INSTITUTE FOR SOIL RESEARCH.

CRAIGIEBUCKLER, ABERDEEN.

The policy of the Institute is to advance the fundamental study of the soil in all aspects, including those of crop production. The final objective is the maintenance and improvement of soil fertility. At one and the same time, both fundamental and applied research is in progress. The following summary of work carried out indicates the main activities during 1946 :—

1. *Soil Fertility*.—Sixty field experiments have been conducted during the year in continuation of the investigation upon the problems of soil fertility. From these, about 1200 soil samples and about 1200 produce samples were collected for analysis.

The ultimate objectives of such work are : (a) the improvement of the utilisation of fertilisers, and (b) the improvement of the technique for the assessment of the nutrient status of soils.

In furtherance of these objectives the integration of field, pot, and laboratory experiments is being attempted on the basis of an adequate field experimentation.

The work has been continued along the following general lines :—

- (1) Interaction of Fertilisers.
- (2) Phosphate Fixation.
- (3) Fertiliser Placement.
- (4) Comparison of Liming Materials.
- (5) Forest Nursery Experiments.

2. *Advisory Work*.—Field and laboratory examination of soils for advisory purposes, with particular reference to liming and manuring, has been continued and extended. During the year over 6300 samples, representing mainly ordinary agricultural land but including also horticultural soils and soils from forest nurseries and sports grounds, have been tested and appropriate advisory reports issued. As in previous years, a considerable number of limestones, calcareous sands, and various industrial by-products of potential agricultural value have also been dealt with.

The analytical data again indicate widespread deficiencies of lime and phosphate, with potash deficiency considerably less extensive but tending to increase in areas intensively cropped during the

war. Old grassland soils continue to show a generally higher potash but a lower phosphate status than those from arable rotation land. In the past the advisory soils have been grouped on the basis of lime status and nutrient contents in relation to geological origin. This classification has proved useful, but it was apparent that little modification of the general conclusions could be expected from the inclusion of further samples, and as a reconnaissance soil survey of Aberdeenshire on the scale of 2.5 inches to the mile is now well advanced, a start has been made with a classification according to the soil map.

3. *Soil Drainage*.—Analytical work on the composition of the quarterly collections of the drainage waters from Craibstone Lysimeters was continued, and progress was made with the analyses of the dried crops.

Rainfall, including snow, during the year 1st October 1945 to 30th September 1946 totalled 36.48 inches, of which from 27 to 37 per cent appeared as drainage.

4. *Soil Survey, Soil Classification, and Pedological Studies—Soil Survey*.—The reconnaissance survey of Aberdeenshire on the scale of 2.5 inches to 1 mile has been completed by the mapping of the western part of the county. Much of this area is hill land afforested or under heather moors, and the survey has been mainly confined to the arable land, of which about 300 square miles have been covered. The following soil associates have been mapped :—

- (1) Countesswells Comprising gravelly sandy loams to medium loams on granitic and gneissic drift.
- (2) Tarves . Heavy loams to sandy clay loams on a mixed glacial drift, derived from acid and basic igneous and metamorphic rocks.
- (3) Inch . Heavy loams to clay loams on basic igneous rock drift.
- (4) Foudland . Silty fine sand loams on argillaceous and schistose rock drift.
- (5) Cuminestown On loamy sand to sandy loam, on glacial drift, derived from rocks of the Old Red Sandstone formation.
- (6) Durnhill . Sandy loams on bedded quartzite and quartz schist drift.
- (7) Leslie . Heavy loams to clays on serpentine drift.
- (8) Gartly . Clay loams on andesitic lava and mixed drift.
- (9) Corby . Loamy gravel to sandy loams on water-sorted and morainic gravel and sand.
- (10) Kemnay . Sandy loams to silty clay loams on water-sorted deposits (alluvium).

The textures of the above refer to the A-horizon of the arable soils ; peaty loams are frequently found on the uncultivated and excessively wet areas.

Each association has been classified into "associates," dependent on the drainage status of the soils, which may vary from freely or excessively drained to very poorly drained.

Soil Mineralogy.—The mineralogical examination of the fine sand fraction of soils and their parent materials from the surveyed areas of Western Aberdeenshire was carried out. The parent materials are mainly glacial drifts underlain by metamorphic rocks with some acidic and basic igneous rock intrusions. Marked variations in the content of ferromagnesian silicate minerals and iron oxides were found, ranging from 5 to 20 per cent, with much variation in the proportion of feldspathic minerals. The results have served to characterise the drifts and to provide a basis for the classification of the soil associations in this area. Similar variations in mineral composition, according to the type of underlying drift, were found. Changes through decomposition of the minerals by weathering have also been noted.

X-ray Analysis.—During the year further progress has been made in the collection of standard data for interpreting photographs of soil clays. The standard feldspar photographs which were made last year have now been fully measured up. A complete series of aggregate photographs of binary mixtures containing kaolinite, montmorillonite, and hydrous mica has been made, and the kaolinite-montmorillonite, hydrous mica-montmorillonite, and kaolinite-vermiculite series have been photographed by the powder method.

The changes taking place in the biotite of the fresh rock on weathering are also being investigated. Yellow flakes of altered mica occur in the sand fractions of some of the soils. X-ray diffraction photographs show that the altered flakes have a greater basal spacing than the fresh biotite, probably due to the presence of water between the sheets. Present indications are that the biotite alters through hydrobiotite to an end-product near vermiculite.

5. *Soil Organic Matter, including Peat Studies.*—Experience in the use of "proximate analysis" procedure for the examination of soil organic matter has led to the development of a modified technique, which is more satisfactory and more rapid for routine purposes and is equally informative. General routine analyses of peats, horticultural soils, and organic soil materials have been carried out by this new method, which has been linked up with the previous routine work.

By applying recent methods it has been found possible to separate the more soluble organic soil complexes into distinct fractions with properties and chemical characters of some interest.

Compost Investigations.—These have been continued and considerably extended, the general plan being the study of the microbial changes occurring in decomposing vegetable material and the concurrent chemical changes in the materials used.

Horticultural Tests have been carried out on the remainder of the peat samples collected during last season. By the use of glass flower-pots it has been possible to obtain much more definite symptoms of

nutrient deficiencies in peat cultures than were obtained when clay pots were used in similar experiments. The value of certain peats as media for the study of certain deficiency symptoms is thus indicated.

6. *Spectrographic Work*.—The application of the cathode layer arc spectrographic methods to the determination of trace constituents in plant and soil materials following chemical concentration has been continued and developed.

Analyses included further studies of the relation of cobalt, nickel, and molybdenum uptake by plants to the soil conditions, and the relative uptakes by different plants at different acidity levels.

Investigations into trace-element contents of soils and pastures, for specific problems, have been made, not only in connection with Scottish problems but also in collaboration with several of the Agricultural Advisory Officers in England and Wales, instances of effects due to excess of zinc and other elements having been found.

Studies on the relationship of trace-element content of soils to geochemical factors have been continued. A brief account of the general applications of spectrographic methods to soil investigations has been published.

7. *Special Investigations—Collaboration with the Animal Diseases Research Association*.—The study of the relation of trace-element contents of soils and plant materials to the incidence of disorders in animals has been continued in collaboration with the Animal Diseases Research Association. The presence of a low, easily soluble cobalt content of the soil has been shown to be associated with a pining condition in sheep in several areas, and an account of this work in the Solway area has been published.

The direct correlation of a trace-element deficiency or excess with the disease of sheep known as swayback has not been established, but abnormal contents of one or more of several elements, including copper, lead, and tin, are often observed where this disease occurs. It does not, however, appear to be related to the molybdenum content of the herbage, as had been suggested in an Australian communication.

Other diseases being investigated include yellowses of sheep and lactation tetany, but so far no definite clue to a possible cause has been obtained.

Collaboration with the Rowett Research Institute.—A joint field experiment is in progress of a reclaimed pasture, the copper content of which was regarded as low. The Macaulay Institute has been responsible for the sampling, analysis, and manuring of the plots, while the Rowett Institute has undertaken the management of the animals and the relevant experimental work upon them.

Collaboration with the Forestry Commission.—The study of the nutrient requirement of forest seedlings is being continued.

EDINBURGH AND EAST OF SCOTLAND
COLLEGE OF AGRICULTURE.

DEPARTMENT OF ADVISORY BACTERIOLOGY.

Bovine Mastitis.—Work on infection in suckled cows is now complete, and that on the influence of season and stage of lactation will be completed during the year.

Nine herds housed in byres have been cleared of *Agalactiæ Mastitis*. In twelve herds kept in courts the incidence of infection has been found to be very low. Work on diagnosis has been continued. The first of a series of bulletins has been published and two more are in preparation.

Cultivation of Lucerne.—Good plots have been established in Midlothian, East Lothian, and Berwickshire.

Green Manuring.—Further attempts have been made to work out a method for measuring directly the quantities of plant material grown for green manuring purposes by undersowing cereals with grasses and clovers.

Soft-rot in Potatoes.—In small-scale experiments evidence was obtained that the organism which causes soft-rot is capable of depressing the yield of tubers in the field.

DEPARTMENT OF ADVISORY BOTANY.

Weed Control.—Further field trials were carried out with the recently introduced weed killer Methoxone. Considerable variation was found in the susceptibility of different species of weeds to the treatment.

Virus Yellows in Sugar Beet.—Investigation of the effect of infection of sugar beet with this disease showed that early infection in particular results in a reduction of yield and fall in sugar content.

Cocksfoot Seed Production.—A field trial to test different levels of nitrogenous manuring showed increased yields of seed from applications up to as much as 167 lb. of nitrogen per acre.

Eyespot Disease of Cereals.—Examination of a large number of samples of wheat and barley confirmed previous indications that the severity of this disease is partly dependent upon the frequency with which susceptible crops have been grown in recent seasons.

Measurement of Pasture Production.—Investigation was started into methods suitable for measurement of the productivity of

grazed pasture. A grazing trial comparing reseeded pasture with old grass was continued.

DEPARTMENT OF ADVISORY ENTOMOLOGY.

Sheep Tick Investigation.—The distribution of the ground population of the sheep tick is not dependent on any particular type of vegetation. The tick is equally to be found among bents, rushes, fescues, deer-hair grass, bracken, and heather, provided that humidity is near saturation. Actually the greatest density of ticks on a hill occurs in areas which, because of their superior grazing qualities, are most attractive to sheep.

With regard to the question of variable seasonal tick activity in different parts of Scotland, experiments would seem to show that, so far as the sheep host is concerned, this is correlated with variations in the practice of sheep husbandry as well as with climatic conditions. A set of experiments is now being conducted in the West of Scotland similar to those previously made on the Borders with a view to clarifying this problem, and will be supplemented by others in Kincardineshire in collaboration with the North of Scotland College of Agriculture for the same purpose. It will then be possible to compare the influence of environment on the sheep tick in these three regions.

Greenfly Investigation.—During 1946 there was no serious outbreak of greenfly affecting crops in the East of Scotland area. The two species, *Myzus persicae* and *Brevicoryne brassicae*, which are of greatest economic importance here, continued at the low level to which they fell in 1945. As a result cruciferous and other crops remained comparatively clean in 1946. In sugar beet, colonies of *M. persicae* were rarely encountered, but nevertheless the disease, Virus Yellows, which infects this crop and is transmissible by *M. persicae*, was fairly prevalent in East Lothian. The spread of the disease in individual fields occurs progressively from July, when the first symptoms appear, to October, during the period when *M. persicae* tends to decrease and even disappear in the crop. Apparently *M. persicae* is not the only agent identified with spread of the disease.

Biting Midges in Scotland.—In the rural districts biting midges are a troublesome pest to outdoor workers and to livestock. Of the two dozen odd Scottish species *Culicoides impunctatus* is the most abundant and pernicious, whilst *C. obsoletus*, *C. heliophilus*, and *C. pulicaris* are usually less numerous and less important.

To study the midge problem a Sub-Committee of the Scientific Advisory Committee of the Secretary of State for Scotland was established in 1945, and contributions to the study of the problem have been made by its various members. In 1945 and 1946 part of the investigation was undertaken by the Department of Entomology, University of Edinburgh, and a study of midge breeding

at Roslin, Midlothian, and at Drumelzier, Peeblesshire, was commenced. For the purpose a box trap was specially designed ("Edinburgh Midge Box Trap"), and has given good results in the identification of the preferential breeding conditions of several biting midges associated with water-logged soil. The results obtained are considered of prime importance, especially in regard to the possible practice of control measures directed against the pest.

Another contribution to the problem which was made by our laboratory was an analytical survey of the biting-midge population at the Trossachs in 1946. The results of this survey have made it manifest that *C. impunctatus* is the most abundant and most troublesome of the biting midges of Scotland.

Other Investigations.—Besides the special investigations sketched above, the following also received attention :—

- (1) Experiments with "Gammexane" in the control of Leather-jackets and Wireworms in field crops.
- (2) Incidence and control of the Mangold Fly in sugar beet.
- (3) Incidence of pests of glasshouse crops, including the Pearly Underwing, the Angle Shades Moth, and the Leather-jacket (*Tipula oleracea*).
- (4) Incidence and control of the Diamond-back Moth in the Lothians.
- (5) Incidence of the Potato Root Eelworm.

VETERINARY INVESTIGATION OFFICER SERVICE.

Abortion in Ewes.—It would appear that at least two types of abortion are seen, one type common in the Lauderdale area and one type common in hill sheep. A considerable number of both types of outbreak have been examined from a pathological and bacteriological aspect. The relationship of tick-borne fever to hill-sheep abortion is being examined both experimentally and in the field.

Mastitis.—Penicillin is being used for the herd eradication of *Strep. agalactiae*, and in conjunction with the advisory bacteriologist it is hoped to expand this work.

Orf Vaccination.—A large field trial with orf vaccine is being run and, in addition, various field strains of virus are being typed.

Sheep Dipping for the Control of Ticks and Blowfly.—In co-operation with the Scottish Hill Sheep Research Committee field trials are being run to test out the efficiency of D.D.T. dip.

Sourhope Farm.—An extensive survey of the diseases of sheep at Sourhope is being carried out.

ADVISORY SOILS DEPARTMENT.

A survey of the results of soil analyses suggested that, since 1939, there has been a reduction in lime and phosphate deficiencies, but an increase in potassium deficiency.

Further liming experiments have confirmed that ground limestone (50 per cent passing 100-mesh sieve) has essentially the same effect on soil and crop yield as an equivalent amount of ground lime, but that a spring application of either in a dry season may not reduce serious soil acidity quickly enough to get a full response in crop.

Six experiments, designed to test the relative values of (a) super-phosphate, (b) silico-phosphate, and (c) mineral phosphate, on various classes of soil deficient in "available" phosphate, showed that on turnips and potatoes the response to (b) was practically as good as that to (a), and the response to (c) was significant in the case of turnips but negligible in the case of potatoes; there were no significant responses in two oat experiments.

An N, P, K, Na, B experiment with sugar beet on a soil deficient in "available" potassium showed a striking response to potassium and a smaller response to salt and nitrogen.

Eight demonstrations to test the effect of twice the normal allocation of potassium to potatoes showed no marked responses or increase in the potassium content of the leaves.

The examination of a further twenty samples of seeds hay confirmed the 1945 results, the crude protein amounting only to 5.8 per cent.

A preliminary investigation on the barn-drying of hay by a draught of cold air gave results which were not completely satisfactory, but it is proposed to repeat the work in 1947.

THE NORTH OF SCOTLAND COLLEGE OF AGRICULTURE.

ABERDEEN.

The main lines of research work in the College have been as set out below.

Control of Tomato Root Eelworm.—Experiments on the use of D.D. soil fumigant against the tomato eelworms *Heterodera marioni* (Cornu) and *H. rostochiensis* (Woll) are being continued. The results of preliminary investigations have already been published in the 'Scottish Journal of Agriculture,' Vol. XXVI., No. 3.

Agricultural Economics Investigation.—Investigations into the economic results of different types of farm practice were carried out by the financial account method.

Studies of the cost of production of oats, potatoes, and turnips

have been made and are being continued so that changes, both physical and financial, may be followed.

Milk production costs throughout the area were collected and analysed, and labour utilisation studies inaugurated. Special attention is being given to fundamental cost structures and, in order to obtain the necessary detail, a number of full cost accounts are in operation.

Chemical Composition of Heather and Grass.—Investigations have been conducted into the chemical composition of heather of different ages and at different stages of growth, and the composition of grass and arable silage and dried grass.

Characteristics of Blackfaced Wool.—Research has been and is being carried out on the physical and chemical characteristics of Blackfaced wool at different seasons. Insecticide work has continued on the formulation and evaluation of new insecticides for the control of insect pests of animals and crops.

Crop Experiments.—The following problems have been and are being investigated :—

- | | | |
|------------------------------|---|---|
| <i>Grain .</i> | { | (a) Maturity and yield trials of several new varieties. |
| | { | (b) Standing power. |
| | { | (c) Thickness of seeding. |
| <i>Potatoes .</i> | { | (a) Selections of healthy stocks. |
| | { | (b) Effect of different treatments and methods of cultivation on the plants. |
| <i>Grasses and Clovers.</i> | { | Comparison of early and late types from different sources. |
| <i>Rotation Experiments.</i> | { | Effect of different kinds and quantities of artificials on all crops throughout the rotation. |

Weed Eradication.—Further trials with Methoxone confirm the results of previous years, that this hormone type selective weed-killer is completely effective against runc and charlock, but gives only partial control of hemp nettle and spurrey. For these weeds sulphuric acid or a D.N.O.C. type weed-killer are still best.

Yield trials again emphasised the importance of early spraying. This secures for the crop early relief from weed competition with a minimum amount of damage from the spraying outfit.

Potato Diseases.—Protective fungicides applied as sprays and dusts gave varying degrees of control of blight. There were indications that damage to the crop by the sprayer can reduce yield. A system of forecasting outbreaks of blight, based on reports from meteorological stations of the occurrence of the critical weather conditions (48 hours during which the temperature remains above 50° F. and the relative humidity over 75 per cent), was operated in 1946.

In implement trials the greatest proportion of the total crop was lifted by an elevator digger and by a power-driven spinner. Damage caused by the elevator and by a spinner with the screen uncovered led to considerable infection by dry rot in the variety Ulster Chieftain lifted in mid-August. Little rot developed in Majestic tubers lifted by the same implements in mid-October.

Beans.—On a farm where the bean crop had failed in the previous year, inoculation with nodule bacteria greatly improved the yield.

Sheep Tick (Ixodes ricinus L.).—A long-term scheme for the investigation and control of external parasites of sheep and cattle on the farm of Glensaugh, Fettercairn, has been planned by the College, and the entomologist has been concerned with investigation on the bionomics of the sheep tick and with an experiment started in 1940 on another farm to test the possibility of clearing tick-infested ground by heather burning, drainage, and systematic moor management.

Greenflies (Aphididæ).—A collection of the species of the region is being made to find out the host-plants and life-histories as far as possible from field observations. Particular attention is paid to the species associated with insect-borne virus diseases of the potato.

Thysanoptera (Thrips).—Particular attention has been paid to the classification, bionomics, and control of British glasshouse thrips.

Pollens and Honey-bee Colonies.—The quantities and sorts of pollen collected by honey-bee colonies throughout the year in relation to the brood-rearing cycle, quantity of bees, flowering periods, and flora of the area were investigated.

Bee Diseases.—Manipulative methods of treatment of bee diseases have been experimented with as an alternative to chemical treatments.

Control of American Foulbrood.—The control of American foulbrood of honey-bees by sulphathiazole, the control of bee paralysis by flowers of sulphur, and the control of acarine disease by various chemicals is being studied.

Investigations on the Replacement of the Root Crop by Grass.—The replacement of the turnip crop by grass sown down without a nurse crop has been further investigated, and several farmers have adopted the method on their own farms. In most cases the newly-sown grass has been grazed by cattle and a corresponding area of second or third year grass set aside for the production of grass silage. One field, however, had the newly-sown grass kept for silage-making right from the beginning. The weeds came up much

faster than the grasses and clovers, thus calling for a cut in a comparatively short time—sown in April and cut in June.

Though this cut consisted of more weeds than grass, the silage made from it *at this early stage* was of exceptionally high feeding value for the dairy cows in winter. At the same time the cutting at that stage served to eliminate the weeds completely, thus resulting in a sward remarkable for both its density and its clean condition.

A word of warning should be sounded here, as some farmers tried to test the system by adopting a piecemeal attitude. A corner of the root field was sown with grass (broadcast) in place of turnips and the area left unfenced and uncut, resulting of course in the weeds choking out the grass seedlings. The most common fault, however, was to hold off too long before starting the grazing.

Sheep Breeding.—An experiment has been started involving the mating of 100 Blackface ewes, 50 to a Border Leicester ram and 50 to a Wensleydale ram, under identical conditions.

Detailed records are being kept, and will eventually include the results from mating the first cross ewes to lowland rams.

Veterinary Investigations.

Hæmatological studies of the response to phosphate therapy in bovine parturient hæmoglobinæmia were continued with promising results.

Further investigations were carried out on the epidemiology of bovine coccidiosis in North-east Scotland. The comparative therapeutic value of sulphamezathine, phthalylsulphathiazole, and phenothiazine were studied in the control of acute cases of the disease.

An extensive survey was made in the county of Caithness into the causation of a seasonal disease producing high mortality in sheep.

THE WEST OF SCOTLAND AGRICULTURAL COLLEGE.

MILK UTILISATION DEPARTMENT.

Milk Recording Procedure.—Following a request from a number of Ayrshire breeders regarding the occurrence of very low fat tests by official recorders on the occasion of their visit, all the likely causes of fat variation in the official Gerber test were re-examined. Inaccuracies in the war-time butyrometers were found more likely to give higher rather than lower fat results. The not infrequent low fat tests alleged by the milk producers could not be put down to improper technique on the part of the official milk recorder. The accuracy of milk sampling and Gerber testing have been examined. In co-operation with the Scottish Milk Records Associa-

tion, two well-conducted milk-recorded farms were selected and samples of mixed evening and morning milk of each cow in the herds were taken by most experienced recorders. These samples were tested in duplicate by a team of experienced testers using standardised equipment and reagents. The sampling and testing were continued over a period of one week. The results confirm the already well-established fact that very wide variations in the percentage of fat in the milk of apparently normal cows may occur on two successive days, and that these variations are more marked with some cows than others.

Graded Milks.—Some graded-milk producers continue to report difficulty with coliform contamination in milk which is otherwise very satisfactory and is of very low bacterial count. This coliform contamination of the milk produced in apparently very clean and satisfactory dairies has been traced to one or other of the following causes : rinsing the equipment after evening milking in contaminated water supply ; the use of improperly washed and unsterilised filter cloths ; the use of a fixed cooler which cannot be placed in the steam chest for steam sterilisation.

A number of graded-milk producers have reported a new anomaly arising from the introduction of the new Scottish Milk Testing Scheme. The official reports of the local authority indicate bacterial counts of only a few thousand, while the creamery resazurin tests report that the milks are of high bacterial numbers. This has caused considerable confusion and bewilderment. The Milk Utilisation Department has confirmed low bacterial numbers and poor resazurin tests in the same milk, and modification in the wording of the report issued from the creamery operating the scheme to the farmer would seem to be desirable to remove the existing confusion.

Cheese Starters and Cheese Manufacture.—New cheese cultures are isolated and tried out on laboratory and semi-commercial scale in cheese manufacture. A number of new cultures have been received from several foreign sources, but these have not proved any more active than cultures produced in our own laboratory. In our own dairy there has been no difficulty with bacteriophage and slow cheese-making. Variable reports have been received from a number of farm and creamery sources on the behaviour of the cultures in commercial practice.

In one case investigated very serious yeast contamination of the creamery and cheese starter was found associated with cheese-making difficulty, and caused very grave down-grading of the creamery cheese output.

Whey Utilisation.—The work on possible new means of utilising our whey supplies continues. Whey has been tried out as a means of reinforcing the food value of certain canned soups, as a substitute for milk in "milk shakes," and in the preparation of fermented beverages.

ANIMAL HUSBANDRY DEPARTMENT.

Effect of Nutrition on the Health and Milk Yield of Dairy Cows and on the Health and Growth of their Progeny.—An experiment was conducted during the winter of 1945-46 to ascertain the effect of feeding silage during the winter months on the health and productivity of dairy cows and their offspring. Twenty-four cows from the College herd, which is free from T.B. and abortion, were paired for age, number of previous lactations, yield, and date of calving. All the cows were given the same maintenance ration, but one group of twelve was fed a production ration containing only concentrates, while half the production ration of the other group of twelve was replaced by grass silage.

The twelve silage-fed cows were normal throughout, but in the other group two cows contracted mastitis, two appeared to calve three weeks prematurely (from the service dates available), and one of these showed milk-fever symptoms.

The silage used appeared to depress the milk yield four to eight weeks after calving by an average of half a gallon per cow per day, but after nine weeks the yields of the two groups were again similar. When put to grass on 29th March the silage group's production increased 5.3 lb. per head daily, while the non-silage group increased by only 0.2 lb. per head daily. Three silage cows calving in March, however, showed little increase.

Of the calves from the silage group, one died and three had various degrees of "scour." In the non-silage group two calves were born dead and five others showed signs of "scouring," two being treated with sulpha-drugs and vitamin preparations.

In the colostrum of both groups vitamin C, initially above the normal value for milk, fell rapidly below normal after twenty-four hours. There were no significant differences between the colostrum of the two groups, either in vitamin C or in carotene contents.

The milk and blood plasma values of the silage group showed significantly higher carotene and vitamin C values. Vitamin C in the blood plasma of the calves of the two groups showed the same trend with the lowest level at two to three weeks of age. The blood carotene of the silage group cows was significantly higher—1688 I.U. as against 705 I.U. per 100 ml. After a month at grass the carotene and vitamin C of the blood and milk of the two groups became similar.

A second experiment was started in the autumn of 1946 in an attempt to verify the findings of the first experiment.

It was planned along the same lines, using as many cows from the first experiment as were available, but the following changes were made :—

1. The amount of silage fed was restricted to the replacement of one-third of the concentrate ration of the cows up to a maximum of 50 lb. silage.

2. Analyses of the milk for vitamin C, carotene, and vitamin A and percentage fat were made in the first, second, third, and fourth weeks after calving, and the calves were fed milk at the rate of 1 lb. per 10 lb. live-weight.
3. Blood samples from the calves were taken as soon after birth as possible and analysed for vitamin C, and the calves were weighed twice a week.

The experiment is still in progress, twenty-three of the twenty-four cows having now calved.

The Requirements of Calves for certain Vitamin Factors for Normal Growth and Health.—Sixty-six calves when one to six days old have been fed diets of separated milk, or separated milk powder, supplemented with fats from various sources and/or purified and standardised vitamin preparations. Records have been made of the periodic live-weights, daily milk consumption, pulse rate, clinical condition, body temperature, and consistency of the faeces of each animal. Analyses have been made of the vitamin content of the separated milk, batches of which have been irradiated to destroy vitamin C. The vitamin A and vitamin C contents of (1) the blood of the calves and (2) the liver of those which succumbed have also been determined.

The results obtained so far have shown that, over the first few weeks from birth, a diet of separated milk plus vitamin preparations leads to an impaired rate of growth and loss of condition in calves.

The missing growth factor (or factors) is maintained in the butter fat, but not in margarine, homogenised in the basal diet.

Fertility of Hill Cattle.—The calving records of the 416 beef cows, maintained during their breeding life on grazings in West Stirlingshire and West Perthshire, were again obtained following the supplementation of the herbage on all the grazings with minerals. It was found that the provision of a mineral mixture high in phosphate was instrumental in increasing the calf crops of the herds from the previous 50 to 60 per cent level to 90 per cent and over, while the calves of the treated animals were livelier and of better quality than in previous years. Symptoms of aphosphorosis, common in control animals, were absent in the mineral treated groups.

In conjunction with the results of the previous year's experiment it is now clear that extensive areas of hill pasture in the Highlands are deficient in phosphate for the needs of breeding cows.

Basis of Selection of Hill Ewes for the Breeding Flock.—The growth records of fifty ewe lambs in the flock of a breeder of Black-face rams were studied during (1) the suckling period and (2) the eight weeks previous to weaning, when they were more dependent on the herbage of the grazing for nourishment. It was shown that in selection of ewe lambs for breeding purposes the flock-

owner paid no consideration to the live-weight gains of the lambs during (1), (2), or during the whole period from the lamb marking in June till weaning in September.

Selection was based almost entirely on the live-weight of the lamb at weaning, which was shown to be dependent largely on the date of birth of the lamb. It appeared that only those lambs which happened to be born during the first ten days of the lambing season were retained in the flock.

Extension of this work to six other flocks has been planned to confirm those findings. The live-weight gains, from birth till stock selection, of 550 lambs are being studied this year.

Cobalt-deficient Hill-grazing Areas. (1) *Growth of Lambs.*—In further work on this investigation, eleven grazings in Ayrshire, Dumfriesshire, and Kirkcudbrightshire were selected to determine the extent of those areas deficient in cobalt for the growth of lambs, but where there is no evidence of "vinqish" in the flocks. The response to copper supplements in addition to cobalt was also determined. Seven hundred and twenty lambs on these grazings were numbered and weighed, and 510 of these were dosed with the appropriate cobalt or cobalt-copper solution during the summer months at monthly periods, when all the animals were reweighed.

The results again showed that the areas on which a response to the treatment was obtained are widespread over the hill-grazing areas.

(2) *Determination of Need for Mineral Supplementation of Diet of Lambs.*—Studies have shown that soil and herbage variation and the grazing habits of animals on the hill frequently render chemical or spectrographic analyses of soil and herbage samples of little value for deciding the need for mineral supplementation of the diet. A refinement of the biological method, in which thirteen pairs of twin lambs were used, has shown the need for supplementary feeding of cobalt on a hill grazing, although the two groups of lambs differed by only $1\frac{1}{2}$ lb. in live-weight after sixty-seven days.

On arable pasture, where it was assumed that cobalt supplementation of the diet was unnecessary, the difference after sixty-seven days of 0.12 lb. in favour of the untreated control group of thirteen twins was not significant.

Stages in the Œstrous Cycle of Hill Sheep.—Observations having been made in 1945 that the period of heat in hill ewes might extend over a prolonged period, a study of this behaviour was made at Auchincruive in November and December 1946. Fifty Blackface hill ewes were transported to Auchincruive on 1st November and a study made of their Œstral cycles over six weeks. It was found that some of these ewes might accept service from a ram for five successive days, and, in the early stages, as many animals remained on heat for three days and longer as showed symptoms for only one or two days. The duration of the first period heat did not

appear to influence the duration of the subsequent period nor the length of the subsequent cycle. The length of the cycle was sixteen to seventeen days.

The lambing records of these ewes are to be studied.

Artificial Insemination of Sheep. (a) *South Ayrshire.*—The lambing records on the hill farms where this operation was carried out showed that the technique adopted met with 20 per cent success in the forty ewes inseminated. The study being made of the stages in the oestrous cycle of hill sheep may provide information to bring the fertility by this method closer to the results of normal mating on the hill.

(b) *Iceland.*—Altogether 604 Icelandic ewes were inseminated from rams maintained in the Department. Of 415 inseminated with Cheviot semen, 69 pregnancies were obtained in Iceland. Of 113 ewes inseminated with Blackface semen, 13 became pregnant, while 8 of 76 ewes inseminated with Leicester semen produced Leicester cross lambs.

It was also found that on some Icelandic farms 80 per cent of the ewes were successfully inseminated and on others none. The fertility of the semen samples was correlated with the length of its period of storage (thirteen to forty-eight hours), and the methylene blue test gave the best indication of the fertility of the samples.

(c) *South Wales.*—In South Wales 74 per cent of pregnancies were obtained in the flock in which 106 ewes were inseminated by another technique. This percentage is slightly higher than the fertility in the same flock during the 1944 and 1945 seasons by natural mating.

Mineral Analyses of Herbage from Sheep Grazings.—One hundred and twenty-six samples of herbage and corresponding samples of the soil and of the subsoil collected from selected hill-sheep grazings in South Ayrshire have been despatched to the Nutrition Laboratory of the Commonwealth Department of Scientific and Industrial Research at the University of Adelaide, Australia, for trace-element analyses. The samples were obtained from separate soil types on grazings where the productivity and health of the flocks were known.

The results of the analyses will show whether the correlations between the composition of the soils and pastures and the incidence of nutritional conditions limiting the productivity of sheep are similar in this country and in Australia.

ROYAL (DICK) VETERINARY COLLEGE.

EDINBURGH.

Pathology Section.—A report has been submitted to the Agricultural Research Council on the work done to date on bovine mastitis. Work on the structure of the normal and abnormal mammary gland of the bovine has been continued, and further work has been

done on a correlation of the pathological changes and the bacteria present in the mammary gland with the bacteria present in the milk.

Work on tuberculosis of the genitalia and mammary gland of the bovine has been continued, particular attention being paid to the pathogenesis of the disease.

A study of the cellular content of the fore-milk of the bovine has been completed and a report is being prepared.

Bacteriology Section.—Work has been continued on the hæmolytic streptococci of domesticated animals and the efficiency of vaccines in combating these infections in cattle and dogs. The work on Johne's disease eradication in a self-contained herd is continuing, and participation in the Agricultural Research Council field experiment on the use of vaccine in this disease has commenced.

Poultry Diseases Section.—Research on neoplastic disease in the fowl is being continued, with special reference to the cultivation of tumours in fertile eggs and virus association therewith. A new cancerous disease of ducks has been described and is being investigated.

Department of Medicine.—Work on fluorine poisoning has been continued. The study of diagnostic methods in veterinary medicine has been further developed, and a second edition of the text-book on 'Diagnostic Methods in Veterinary Medicine' has been published.

Department of Physiology.—The investigation of carbohydrate metabolism in domesticated animals is continuing. Some experiments have also been carried out on the rate of uptake of oxygen by equine blood in vitro.

MILK RECORDS.

By JAMES A. PATERSON, Superintendent-Secretary,
The Scottish Milk Records Association.

SYSTEMATIC Milk Recording in Scotland was continued in 1946 under the direction of the Scottish Milk Records Association on the same lines as in 1945 and previous years.

The Association in 1946 consisted of the following representatives from local Milk Recording Societies, Breed Societies, Agricultural Colleges, Research Institutes, Milk Marketing Boards, the Department of Agriculture for Scotland, and certain co-opted members :—

Name and Address.	Body Represented.
Mr C. M'Allister, Braehead Farm, Sliddery	Arran Milk Recording Society.
Mr E. A. Bell, Blairston Mains, Alloway .	
Mr D. Paterson, Kersepark, Hollybush .	
Mr J. M. Stevenson, Bankend, Cumnock	South Ayrshire Milk Recording Society.
Mr J. Baird, Birnieknowe, Auchinleck .	
Mr Thomas Black, Balig, Ayr .	
Mr J. Templeton, Willoxton, Mauchline .	
Mr R. H. U. Stevenson, Corseclays, Ballantrae	
Mr R. W. Montgomerie, Lessnessock, Ochiltree	
Mr Robert Lohoar, Greenlees, Cambuslang	
Major D. C. Bowser, Argaty, Doune .	Central Scotland Milk Recording Society.
Dr Blackwood, Hill of Kilncadzow, Carluke	
Mr T. Johnstone, Standalane, Falkirk .	
Mr M. Bowie, Balmuirdy, Maryhill, Glasgow	
Mr Wm. M'Lachlan, East Crookedstone, Quarter	
Mr D. Howie, Hillend, Crossford, Carluke	
Mr A. D. M'Laren, Craigrie, Clackmannan	
Mr T. Pettigrew, Hairmyres, East Kilbride	Dumbartonshire Milk Recording Society.
Mr Robert Watt, Milligs Farm, Helensburgh	
Mr George P. Ross, Three Oaks, Fintry .	

Name and Address.	Body Represented.
Mr A. Kirkpatrick, Barr, Sanquhar .	Dumfriesshire Milk Recording Society.
Mr I. Harvey, Nether Keir, Auldgirth .	
Mr W. Sloan, Shawsmuir, Closeburn .	
Mr J. Young, Mouswald Grange, Dumfries	
Mr J. Jamieson, Roundbush, Annan .	
Mr J. Woodburn, Quhytewoolen, Lockerbie	Lothians and Border Milk Recording Society.
Mr Mungo Sloan, Uplands, Edinburgh Road, Dumfries	
Mr D. S. Clark, Bellshiel, Duns .	
Mr R. Chalmers Watson, Fenton Barns, Drem	
Mr J. S. Dickson, Horsburgh Castle, Peebles	
Mr J. W. Clement, East Pitkierie, Anstruther	Fife Milk Recording Society.
Mr G. W. Lambie, Nether Pratis, Leven	
Mr Wm. Young, Jun., Craigencalt, Kinghorn	
Mr Alistair Munro, Dell of Inshes, Inverness	Highland Milk Recording Society.
Mr R. Millar, Auchaleek, Campbeltown .	Kintyre Milk Recording Society.
Mr T. B. M'Gregor, Lesserlinn, Lanark .	Lesmahagow Milk Recording Society.
Mr J. Brown, Cormiston Towers, Biggar .	
Mr R. Kerr, Rutherford Manse, Newton Stewart	Machars Milk Recording Society.
Mr J. Wallace, Whitehills, Sorbie .	
Mr A. C. W. Brown, Prestrie, Whithorn .	
Mr James Howie, Eglinton Mains, Irvine .	North Ayrshire Milk Recording Society.
Mr G. Templeton, Carnell Home Farm, Hurlford	
Mr J. Howie, Hillhouse, Kilmarnock .	
Mr David Wallace, Auchenbrain, Mauchline	
Mr James Hair, South Lissens, Dalry .	
Mr John Allan, Loanhead, Beith .	North of Scotland Milk Recording Society.
Mr A. Spence, Commieston, Montrose .	
Mr T. Young, Middleton, Dundee .	
Mr E. Mitchell, Drimmies, Inverurie .	
Mr J. A. Stephen, Conglass, Inverurie .	
Mr R. G. Young, Arradoul Mains, Buckie	Renfrew and Bute Milk Recording Society.
Mr Robert Howie, Flatterton, Greenock .	
Mr J. Raeside, Hattrick, Kilmacollm .	
Mr John Forster, Mains of Larg, New Luce	Rhins of Galloway Milk Recording Society.
Mr A. N. M'Caig, Challoch, Kirkcolum	
Mr J. M'Intyre, Logan Mains, Stranraer .	
Mr J. H. Murray, Beoch, Stranraer .	
Mr A. R. M'Caig, Caldons Hill, Stranraer .	

Name and Address.	Body Represented.
Mr J. G. Baird, Kirkohrist, Kirkcudbright Mr R. Dunlop, Midkelton, Castle Douglas . Mr J. G. M'Myn, Kirkhouse, Kirkbean, Dumfries Capt. J. M. Gilmour, Chapelton, Borgue . Mr J. M'Gill, Hillowton, Castle Douglas . Mr F. J. Young, Congeith, Kirkgunzeon, Dumfries	Stewartry Milk Recording Society.
Mr J. R. Parker, Auchenhay, Twynholm. Col. W. T. R. Houldsworth, Kirkbride, Maybole	
Mr A. W. Montgomerie, Westburn, Cambuslang	
Mr James Howie, Muirside, Dumfries .	
Dr A. B. Fowler, Kirkhill, Ayr .	
Mr J. Kilpatrick, Craigie Mains, Kilmarnock	
Capt. Robertson, Linkwood, Elgin .	Ayrshire Cattle Herd-Book Society.
Mr J. Wither, Awhirk, Stranraer .	
Mr Thomas Johnston, Standalane, Falkirk	Highland and Agricultural Society.
Mr W. J. Kilpatrick, Muirhouse, Kilmarnock	
Mr J. S. Stevenson, Balig, Ballantrae .	British Friesian Cattle Society.
Mr John Kirkwood, 6 Blythswood Square, Glasgow	
Mr John F. Niven, Mahaar, Kirkcolm .	West of Scotland Agricultural College.
Dr A. D. Buchanan-Smith, House of Cockburn, Balerno	
Dr A. M. Smith, 13 George Square, Edinburgh	Edinburgh and East of Scotland College of Agriculture.
Mr M. Mackie, North Ythsie, Tarves .	
Mr A. R. Wannop, 41½ Union Street, Aberdeen	North of Scotland College of Agriculture.
Mr J. C. Grant, Marischal College, Aberdeen	
Dr Norman C. Wright, Kirkhill, Ayr .	Hannah Dairy Research Institute.
Dr A. B. Fowler, Kirkhill, Ayr .	
Mr John Forster, Mains of Larg, New Luce	Animal Diseases Research Association.
Mr W. Cassels Jack, Glenpark, Braxfield Road, Lanark	
Sir George Wilson, Carbeth Home Farm, Balfron Station	Scottish Milk Marketing Board.
Mr Wm. Young, Skerrington Mains, Hurlford	
Mr P. M. Pottie, Dalziel, Dalcross, Inverness	North of Scotland Milk Marketing Board.
Mr J. G. Singer, 38 Gray Street, Aberdeen	
One Representative	Aberdeen and District Milk Marketing Board. Dept. of Agriculture for Scotland.

Name and Address.	Body Represented.
Sir Guy Shaw-Stewart, Bt., Ardgowan, Inverkip	} Co-opted Members.
Mr John Speir, Hope Street, Glasgow .	
Mr Allan Barr, Hobsland, Monkton .	
Dr H. P. Donald, Institute of Animal Genetics, King's Buildings, West Mains Road, Edinburgh 9	
Mr Wm. Adair, Editor, 'N.B. Agricul- tural and Farming News,' Buchanan Street, Glasgow	

Chairman—Mr George Templeton.

The following were the principal members of the staff :—

Superintendent-Secretary—Mr James A. Paterson.

Assistant Superintendents { Mr Percy H. Hart.
Mr John M'Nicoll.
Miss Mary Jamieson.

ADMINISTRATION.

As in previous years, the scheme of recording was administered by the Association through local Milk Recording Societies, and a grant was obtained from the Treasury through the Department of Agriculture for Scotland to meet administration costs. A grant of 2s. per cow recorded was also obtained from the Ministry of Food through the Milk Marketing Boards to reduce the cost of Milk Recording to individual herd owners.

During the latter part of 1945 and the earlier months of 1946 special efforts were made to obtain new members for local Societies throughout the various districts of Scotland, and over 300 applications were obtained, but for various reasons—such as members disposing of their herds or removing from their farms, &c.—there were, as usual, a number of resignations.

All the local Societies which operated in 1945 continued in 1946, with one exception. In the past, three local Societies operated in Ayrshire, but towards the end of 1945 at a joint meeting between representatives of the three Societies concerned it was agreed that in future there should be only two Societies, one covering the northern district and one the southern district. The Central Ayrshire No. 2 Society went out of existence and the members of that Society were mainly absorbed into the North Ayrshire Society.

To accommodate new members, additional circuits were put into operation in the following Societies :—

	Society.	Additional Circuits.
North Ayrshire	6
Central Scotland	3
Dumfries	1
Highland	1
Kintyre	1
Lesmahagow	1
Machars	1
North of Scotland	2
Renfrew and Bute	1
Stewartry of Kirkcudbright	2

The number of recorders' circuits operated in 1946 was, therefore, 72, an increase of 19 over that of the previous year. The number of herds officially tested was 1469, and the number of cows officially recorded 76,347, an increase of 264 herds and 15,291 cows from the previous year, and the largest number of herds and of cows tested in the history of the Association.

The following is a list of the Milk Recording Societies which operated in 1946, with the name and address of the Secretary of each Society :—

Name of Society.	Secretary.
Arran	Mr J. M'Alister, Bellevue, Sliddery.
South Ayrshire (8 circuits)	Mr E. A. Bell, 2 Miller Road, Ayr.
Central Scotland (9 circuits)	Mr Arthur Gilmour, C.A., 23 Silvergrove Street, Glasgow.
Dumbartonshire (2 circuits)	Mr R. Bilsland, 35 Wylie Avenue, Alexandria.
Dumfriesshire (7 circuits)	Messrs Henderson & Mackay, Solicitors, Lockerbie.
Lothians and Border (3 circuits)	Messrs Inglis, Orr & Bruce, 19A Hill Street, Edinburgh.
Fife (3 circuits) . . .	Mr J. W. Smith, Commercial Bank, Thornton, Fife.
Highland (2 circuits) .	Mr J. Murdoch Hunter, North of Scotland Bank, Queensgate, Inverness.
Kintyre (2 circuits) .	Mr J. M. Macdonald, Largie Estate Office, Tayinloan, Argyll.
Lesmahagow (2 circuits) .	Mr T. M'Kail, British Linen Bank, Lesmahagow.
Machars (3 circuits). .	Mr James Gordon, Black Bull Hotel, Newton Stewart.
North Ayrshire (9 circuits)	Mr G. F. F. Smith, Union Bank, Kilmarnock.
North of Scotland (6 circuits)	Mr R. C. May, 77 Crown Street, Aberdeen.
Renfrew and Bute (3 circuits)	Mr Thomas Hunter, 35 High Street, Paisley.
Rhins of Galloway (5 circuits)	Mr W. Brown Moir, Cairnslea, Stranraer.
Stewartry (7 circuits) .	Mr Patrick Gifford, Solicitor, Castle Douglas.

The following Table shows for each Society or Circuit the number of herds, the number of cows tested, the average interval between tests, and the duration of the recording season :—

Name of Society or Circuit.	No. of Herds.	No. of Cows Tested.	Average interval between Tests (Days).	Duration of Recording Season (Weeks).
1. Arran	24	528	28	52
Ayrshire (North)—				
2. No. 1	20	787	26	52
3. No. 2	22	934	28	52
4. No. 3	17	718	23	52
5. No. 4	17	816	23	52
6. No. 5	18	934	24	52
7. No. 6	19	708	25	52
8. No. 7	19	841	25	52
9. No. 8	18	784	24	52
10. No. 9	19	664	25	52
Ayrshire (South)—				
11. Auchinleck	21	985	27	52
12. Ayr and Maybole	23	1126	28	52
13. Cumnock	22	902	28	52
14. Dalrymple and Coylton	21	876	27	52
15. Girvan	21	1155	27	52
16. Maybole and District	20	1055	26	52
17. Ochiltree and Coylton	21	855	27	52
18. Tarbolton and Troon	20	1076	26	52
Central Scotland—				
19. Bathgate and Linlithgow	21	956	27	52
20. Cambuslang and Bargeddie	18	1110	24	52
21. Denny and Falkirk	17	512	23	52
22. East Kilbride and Mearns	21	989	27	52
23. Kelvin Valley	17	1127	23	52
24. Lanark and Carluke	19	899	25	52
25. Sandford and Kirkmuirhill	21	1011	27	52
26. Stirling and Dunblane	22	1009	28	52
27. Strathaven and Quarter	21	1010	27	52
Dumbartonshire—				
28. No. 1	21	1057	27	52
29. No. 2	23	1090	28	52
Dumfriesshire—				
30. No. 1	21	1067	27	52
31. No. 2	21	905	27	52
32. No. 3	20	1002	26	52
33. No. 4	20	1256	26	52
34. No. 5	22	940	28	52
35. No. 6	20	1024	26	52
36. No. 7	20	1100	26	52
Carry forward ,	727	33,808	..	..

Name of Society or Circuit.	No. of Herds.	No. of Cows Tested.	Average interval between Tests (Days).	Duration of Recording Season (Weeks).
Brought forward .	727	33,808	..	..
Fife—				
37. No. 1	20	1326	26	52
38. No. 2	22	1245	28	52
39. No. 3	22	992	28	52
Highland—				
40. No. 1	20	911	26	52
41. No. 2	21	936	27	52
Kintyre—				
42. No. 1	16	675	22	52
43. No. 2	17	774	23	52
Lesmahagow—				
44. No. 1	24	1102	28	52
45. No. 2	23	994	28	52
Lothians and Border—				
46. No. 1	20	1088	26	52
47. No. 2	22	1222	28	52
48. No. 3	24	958	28	52
Machars—				
49. No. 1	22	1126	28	52
50. No. 2	20	1227	26	52
51. No. 3	22	1269	28	52
North of Scotland—				
52. No. 1	21	1426	27	52
53. No. 2	22	1509	28	52
54. No. 3	18	1013	24	52
55. No. 4	21	1227	27	52
56. No. 5	21	1413	27	52
57. No. 6	18	1296	24	52
Renfrew and Bute—				
58. No. 1	20	811	26	52
59. No. 2	19	778	25	52
60. No. 3	23	764	28	52
Rhins of Galloway—				
61. Kirkcolm	20	1457	26	52
62. Kirkmaiden	17	1452	23	52
63. Luce Valley	21	1569	27	52
64. Stoneykirk	20	1477	26	52
65. Stranraer	23	1397	28	52
Stewartry—				
66. No. 1	19	1412	25	52
67. No. 2	22	1136	28	52
68. No. 3	21	1236	26	52
69. No. 4	20	1566	26	52
70. No. 5	20	1207	26	52
71. No. 6	20	1168	26	52
72. No. 7	21	1380	27	52
Total No.	1469	76,347	..	..

DEFINITIONS.

The milk records compiled by the Association are records of the estimated quantity of milk produced by each cow in a separate lactation and of the estimated percentage of milk fat contained in the milk. For convenience a gallon of milk is reckoned as 10 lb. A gallon of milk of average quality weighs almost exactly 10½ lb.

The following further particulars concerning each record are also given wherever possible :—

- Name of cow.
- Byre number.
- Herd-book number.
- Tattoo markings.
- Sire of cow and herd-book number.
- Dam of cow and herd-book number.
- Date of birth.
- Date of calving preceding opening of record.
- Number of weeks in milk.
- Date of calving after record closed.

The milk yields are estimated in respect of quantity and milk-fat percentage from the results of systematic periodic tests by trained recorders. The recorders visit the farms for this purpose at intervals varying from 21 to 28 days, and each day of visit is regarded as the middle day of the period covered by the test. Milk Records estimated in this way approximate closely to the actual milk yields.

METHOD OF RECORDING.

A distinctive feature of milk recording in Scotland is that the records are entirely the work of trained official recorders, who are the employees of the Association. Recorders have previously to undergo a special course of training in milk recording at the West of Scotland Agricultural College or other approved College of Agriculture. Only candidates of good character and good general education are selected to attend these courses, and all recorders before appointment must obtain a certificate of proficiency.

All dairy farmers taking advantage of the Association's scheme are arranged into local Milk Recording Societies, the Executive Committee of the Association having power to transfer members from one local Society to another in order to find accommodation for new applicants and at the same time avoid overlapping of recorders' circuits.

The official recorder arrives at the farm in the afternoon and is accommodated at the farm overnight. All cows giving milk in each herd, as far as possible, are included in the records. Each

cow is clearly distinguished in the byre by a stall number on the wall immediately in front of and above the level of the cow, and cows are also indelibly tattooed on the ears with distinctive registered tattoo markings. The cows are milked in the same rotation, evening and morning, on the occasion of the recorder's visit. The recorder weighs and samples the milk of each cow in the evening, noting the time at which each cow is milked, and enters the results in the corresponding columns in the byre sheet, taking up a position in the byre as near to the milkers as possible, so as to have them in full view and, as far as practicable, receiving the milk direct from the milker at the cow's side. He or she again weighs and samples the milk of each cow in a similar manner in the morning and enters the results in the byre sheet. A mixed evening and morning proportionate sample of milk for each cow is then tested by the Gerber method for percentage of milk fat. The recorder is required to see that all milk samples and byre sheets are securely locked up overnight or during his or her absence. From the daily results the recorder calculates and completes the byre sheets, multiplying the yields by the exact number of days which have elapsed since the last test, but so calculating throughout that each day of the visit is regarded as the middle day of the period covered by the test. Special ready-reckoners are used to facilitate calculating and to ensure greater accuracy.

The byre sheets are written out in duplicate. The principal copies are posted at regular intervals to the office of the Association and the second copies left with the respective members. The recorder transfers the results from the extended byre sheets to the milk record book for the herd indelibly in ink, each cow being assigned a separate page, at the top of which full particulars of the cows are entered, including the indelible tattoo marks on the animal. Visits of inspection are made to each recorder and to the members of local Societies at the different farms periodically throughout the year by members of the Association's staff, and reports thereon submitted to the Executive Committee.

During the year a number of surprise tests are made by the Association's staff in order to check the recorder's work. Re-tests of the milk samples already tested by the recorder are also carried out; for this purpose recorders are instructed to retain the milk samples each morning till 12 noon.

All records are closed at the end of December, the current lactations being carried forward to the new books of the following year. Finally, summary sheets are written out in duplicate showing the total milk yield for each cow for the lactation or part lactation, with full particulars of the cow, dates of calving, &c. The principal copy of the summary sheet is posted to the Association's office with the record book and the second copy is left with the owner of the herd.

All record books and summary sheets are carefully revised, corrected in detail, and initialed in the Association's office during the next few months, the record books being returned later to the

respective members, and the summary sheets retained and bound for future reference.

The milk records are next classified into three groups for cows and heifers respectively. Experience has confirmed the view that the most useful comparison is obtained by reckoning the yields in terms of pure butter fat. Such a comparison takes into consideration both the quantity and the quality of the milk.

Cows with a milk record equivalent to not less than 280 lb. of butter fat, and heifers with a milk record equivalent to not less than 224 lb. of butter fat, are grouped in Class I. Cows and heifers with milk records of less than two-thirds of these amounts—viz., 186 and 149 lb. of butter fat respectively—are grouped in Class III.

The following short Table shows the corresponding values of these yields in fairly good milk of 3·5 per cent milk fat :—

Class.	Yield of Butter Fat. (Lb.)	Corresponding Yield in Milk of 3·5 per cent Fat. (Gallons.)
Cows in Class I. . .	Not less than 280 .	800
Heifers in Class I. . .	Not less than 224 .	640
Cows in Class III. . .	Less than 186 .	531
Heifers in Class III. . .	Less than 149 .	426

All cows and heifers with milk yields falling between these limits come into Class II. Such animals naturally claim less attention than the good milkers or the obviously unprofitable animals. It should be noted, however, that Class II. includes a certain number of unclassifiable yields, as there are a number of cases where for various causes the results of a whole normal lactation cannot be obtained.

Finally, there is prepared Tables showing the number of cows tested in each herd in each circuit, and also showing the percentage of Class I. and Class III. animals. In these Tables the name of the herd is not given, but is distinguished by a letter of the alphabet. Each recording herd owner is provided with a copy of the Table for his particular circuit and is informed as to the letter which represents his herd. A herd owner is therefore in a position to compare his own results with that of the remaining members of the circuit, although he cannot be sure of their actual identity.

PROSPECTS FOR 1947.

The demand for milk recording has continued, and since the beginning of the year one new Society and nineteen additional circuits have been put into operation. With the formation of this new Society in Caithness, milk recording is now being practised in every county on the mainland of Scotland. There is still a demand,

and still further additional circuits are expected to be put into operation during the months of August and September. The membership has increased by 168 since the beginning of the year, and it is anticipated that there will be approximately 85,000 cows officially tested and recorded during 1947.

The Association have been considering means whereby the volume of valuable data obtained through milk recording can be made use of in the interests of the dairying industry, and after various meetings with the Technical Committee of the Scottish Agricultural Advisory Council and the Department of Agriculture for Scotland the Association are to set up a Scientific Advisory Committee, and they have also agreed to make available to the Herd Improvement Office or Bureau, when it is brought into operation, any data required. They have also agreed to co-operate in the collection of information in regard to disease, &c., as required by any of the Research Institutes.

ANALYSES FOR MEMBERS DURING THE FIRST FIVE MONTHS OF 1946.

By MARSHALL J. ROBB, B.Sc., F.R.I.C., AND JOHN E. RITCHIE, M.A.,
B.Sc., F.R.I.C., Aberdeen.

THE samples analysed on behalf of members during the first five months of 1946 may be summarised as follows :—

Fertilisers.—Of the fertilisers analysed the majority were intended for the potato crop. The average composition of these was : nitrogen 6·2 per cent, soluble phosphoric acid 7·9 per cent, insoluble phosphoric acid 1·2 per cent, and potash 9·4 per cent. The nitrogen percentage ranged from 4·1 to the unusually high figure of 8·5 per cent, while the variation in the potash content was from 6·0 to 12·4 per cent. It may be noted that in this type of fertiliser the insoluble phosphoric acid content is low, while in the turnip manures analysed the proportion of this constituent ranged from 9·3 to 16·3 per cent. The average composition of the turnip fertilisers sent for analysis was : nitrogen 4·3 per cent, soluble phosphoric acid 5·8 per cent, insoluble phosphoric acid 12·3 per cent, and potash 5·2 per cent.

A sample of ground lime contained only 40·9 per cent of caustic lime, while one of English lime shells showed a caustic lime content of 70·5 per cent. Several samples of ground limestone were analysed and were of various grades, the calcium carbonate content ranging from 74 to 94 per cent. The fineness of grinding (proportion passing through the standard sieve) ranged from 56 to 64 per cent.

Feeding-stuffs.—Three samples of feeding meal were found to be satisfactory. The proportions of fibre were fairly low, ranging from 5·3 to 7·8 per cent. One of the samples had a very high proportion of protein, viz., 49·4 per cent.

A sample of fish meal was found to contain only 55·1 per cent of protein, a distinctly lower proportion than is usually found in white fish meal. The proportion of phosphoric acid in this sample, 9·7 per cent, was above the average.

Milks.—Three samples of sweet milk analysed for butter-fat content were satisfactory, the proportion ranging from 3·75 to 4·38 per cent.

Waters.—Twenty-two samples of water were examined, of which eighteen were passed as satisfactory for domestic use. In the case of two of the remaining samples, the results of analysis

indicated that the pollution was probably of a temporary nature due to the ingress of surface or drainage water.

One sample from a hot-water circulation was found to contain dissolved copper to the extent of 4 parts per million.

Two samples were examined bacteriologically. One was of excellent quality, while the other was of satisfactory quality, with regard to the number of organisms present and the coliform organisms test.

Poisons.—Six examinations for poisons were made in the stomach contents of live-stock.

A rat poison was found to have been the cause of death of a fowl. The crop contents contained 4.9 per cent of barium carbonate.

A small amount of arsenic, of the order of 10 parts per million, was found to be present in the stomach contents of a heifer. Traces of bismuth, probably administered, were present in the stomach contents of a cow.

Miscellaneous.—Material from an aerodrome thought to be of possible value as a fertiliser was found to consist of common salt.

A sample of earth, sent for determination of the proportion of calcium carbonate, was found to contain 45 per cent.

THE CEREAL AND OTHER CROPS OF SCOTLAND FOR 1946.

THE following comparison of the cereal and other crops of 1946 with those of the previous year has been prepared by the Secretary of the Society from answers to queries sent to leading agriculturists in different parts of the country.

The queries issued by the Secretary were in the following terms :—

1. What was the quantity, per imperial acre, and quality of grain and straw as compared with last year, of the following crops ? The quantity of each crop to be stated in bushels or cwts. What quantity of seed is generally sown per acre ?—(1) Wheat, (2) Barley, (3) Oats.
2. Did the harvest begin at the usual time, or did it begin before or after the usual time ? and if so, how long ?
3. What was the quantity, per imperial acre, and quality of the hay crop, as compared with last year, both as regards ryegrass and clover respectively ? The quantity to be stated in tons and cwts.
4. Was the meadow hay crop more or less productive than last year ?
5. What was the yield of the potato crop, per imperial acre, as compared with last year ? The quantity to be stated in tons and cwts. Was there any disease ? and if so, to what extent, and when did it commence ? Were any new varieties planted, and with what result ?
6. What was the weight of the turnip crop, per imperial acre, and the quality, as compared with last year ? The weight of the turnip crop to be stated in tons and cwts. How did the crop braird ? Was more than one sowing required ? and why ?
7. Were the crops injured by insects ? State the kinds of insects. Was the damage greater or less than usual ?
8. Were the crops injured by weeds ? State the kinds of weeds. Was the damage greater or less than usual ?
9. Were the pastures during the season of average growth and quality with last year ?
10. How did stock thrive on them ?
11. Have cattle and sheep been free from disease ?
12. What was the quality of the clip of wool, and was it over or under the average ?

From the answers received, the following notes and statistics have been compiled :—

EDINBURGH DISTRICT.

MID-LOTHIAN. *Wheat*—Average, 44 bushels per acre; yield reduced owing to bad harvest weather; quality varied; considerable sprouting; seed sown, $3\frac{1}{2}$ bushels per acre; quality of straw below average. *Barley*—48 bushels per acre; quality surprisingly good considering the weather; seed sown, $3\frac{1}{2}$ bushels per acre; straw less damaged than wheat or oat straw. *Oats*—56 bushels per acre; considerable loss due to sprouting in the lower and shedding in the upper districts; quality very varied, the best samples coming from the higher district; seed sown, 5 bushels per acre; quality of straw poor. *Harvest*—Started early in the lower district, but was protracted and difficult owing to the shocking weather; a spell of good weather at the end of September enabled high-ground farmers to secure their grain in good condition. *Hay*—Prolonged drought during the growing period reduced the bulk considerably; crop was well secured and weighed well; 40 cwt. per acre. *Meadow Hay*—Rain at the end of June and the beginning of July benefited this crop greatly; quality fair; 30 cwt. per acre. *Potatoes*—A very heavy crop, $9\frac{1}{2}$ tons per acre; blight was very evident on the shaw in September, but with perfect lifting conditions no apparent damage to the tubers has been noted; leaf-roll worse than for many years and considerable quantities of seed uncertified; a larger proportion of ware than usual; seed in very short supply. *Turnips*—The worst crop for some years; the arid conditions during the brairding period brought the crop to a standstill and many were resown, sometimes more than once; many blanks in the rows; return not more than 13 tons per acre. *Insects*—Turnip-fly much worse than usual; some “finger-and-toe” disease observed. *Weeds*—Owing to the dry spring, charlock was noticeably absent; many turnip crops infested with weeds owing to the slow braird. *Pastures*—Grass very scarce in spring and early summer; the conditions which made harvest so troublesome produced more growth in August, September, and October than has been known for years. *Live Stock*—Throve well; no disease out of the usual was noticed. *Clip of Wool*—Quality, average; quantity, average in park sheep, but rather under average on the hill.

EAST LOTHIAN (Upper). *Wheat*—48 to 56 bushels per acre; straw, 30 cwt. per acre; quality only fair, some sprouted pickles in grain; not nearly so good as previous year; seed sown, 4 bushels per acre. *Barley*—50 to 68 bushels per acre; straw, 25 cwt. per acre; quality fair; not as good as previous year, but yields very good considering season; seed sown, 3 bushels per acre. *Oats*—70 to 80 bushels per acre; straw, 23 cwt. per acre; quality only fair, not nearly so good as previous year; a good deal of discoloured grain; seed sown, 5 to 6 bushels per acre. *Harvest*—Owing to wet weather very protracted; started second week of August, and lasted into October before being finished; secured in fair condition, and in much better order than was expected, as weather remained cool with high winds. *Hay*—Very good and secured in excellent order; up to 3 tons per acre. *Meadow Hay*—None grown. *Potatoes*—Big crop; 10 to 11 tons per acre; better than previous year; disease on haulms at end of August did not go to tubers to any extent; no new varieties tried. *Turnips*—18 to 20 tons per acre; poorer than previous year; crop very slow to braird owing to long dry spell in May and June, but only one sowing required. *Insects*—No damage. *Weeds*—No injury. *Pastures*—

Suffered by the long dry spring and early summer, and were short of growth as compared with last year. *Live Stock*—Owing to bare pastures did not thrive as well as in previous year, but cattle and sheep were free from disease. *Clip of Wool*—Good quality ; average quantity.

EAST LoTHIAN (Lower). *Wheat*—Some very heavy crops up to 76 bushels per acre ; average, 56 bushels grain and 2 tons straw ; quality badly spoiled by sprouting due to bad weather during early part of harvest ; seed sown per acre, 3 bushels. *Barley*—Some very heavy yields of grain from combine harvesters, up to 80 bushels per acre ; average, 64 bushels per acre ; straw, 30 cwt. per acre ; only slightly damaged by bad harvest weather ; seed sown, 3 bushels per acre. *Oats*—A good crop which stood well ; average yield, 80 bushels per acre ; straw, 30 cwt. per acre ; quality badly damaged by sprouting during bad harvest weather ; seed sown, 4 to 5½ bushels per acre. *Harvest*—Began about end of first week of August ; for the first month the weather was the worst in living memory and much grain was badly spoiled ; then the next fortnight brought very fine weather and the crop was eventually secured in wonderfully good condition. *Hay*—Ryegrass, the only kind grown, was a rather light crop owing to very dry spring ; average, 2½ tons per acre ; quality very good. *Meadow Hay*—None grown. *Potatoes*—All over a very fine crop ; at least 2 tons per acre more than 1945 ; digging of earlies began about 16th June ; lates were lifted in good condition ; very little blight ; crop about 11 tons per acre ; no new varieties tried. *Turnips*—Lighter than 1945 ; very slow to braird ; three or four sowings were required in some cases ; 25 tons per acre. *Insects*—Green-fly did a lot of damage to potatoes, causing much more leaf-roll than usual. *Weeds*—Damage less than usual. *Pastures*—Good, but not nearly so good as in 1945. *Live Stock*—Did only fairly well, but cattle and sheep generally were free from disease. *Clip of Wool*—Average quality and crop.

BORDER DISTRICT.

BERWICKSHIRE (Merse). *Wheat*—A useful crop ; acreage up on the previous year ; was mostly standing at cutting-time ; less sign of rust, but the disease commonly called "take all" more prevalent ; damage from sprouting was considerably less than in 1945 ; yields of good quality, grain about 40 to 46 bushels per acre ; bushel weight, 62 lb. ; straw good, of average length, up to 28 cwt. per acre ; seed sown, 3 to 4 bushels per acre. *Barley*—Troublesome to cut ; a very high yield of grain, 72 to 80 bushels per acre not uncommon, with an average of 60 bushels ; quality variable on account of so much lying ; straw plentiful, 22 cwt. per acre, of fair quality ; seed sown, 2 to 2½ bushels per acre. *Oats*—A good crop all over, with fine quality grain, and yields well over an average ; 72 bushels per acre, and up to 96 bushels or more per acre ; bushel weight, 43 lb. ; straw good, not too much broken at harvest-time ; 27 cwt. per acre ; seed sown, 5 to 5½ bushels per acre. *Harvest*—Commenced the second week of August—earlier than usual, and was general by the following week ; unfortunately the weather broke for the last two weeks of the month, and work was held up until well into September, by which time crops were laid and many over-ripe ; it was well into October before fields were all cleared ; the loss from sprouting, however, proved nothing like so serious as in the previous year. *Hay*—A light crop of average quality, with a good show of clover ; secured in good condition ; weight per acre no more than 25 cwt. *Meadow Hay*—A shorter crop, and, being late, a good deal was

spoilt by broken weather. *Potatoes*—Yield on average somewhat higher, with some exceptional returns of 10 to 12 tons per acre; a good deal of blight entailed more spraying than usual, and there was rather more loss in pits through spread of the disease and heating; weather at time of lifting was generally favourable. *Turnips*—The best crop of roots grown for some years; brairds were slow to come to the hoe, but grew quickly after; little or no resowing, except where the young plants hung overlong as the land was very dry, and fly got the better of them; a few complaints of finger-and-toe, but more about the growth of annual weeds; tonnage, 24 and over per acre. *Insects*—Little damage; some cases of moth on swedes, but the crop mostly recovered. *Weeds*—Annuals were most troublesome, and difficult to control owing to shortage of experienced labour. *Pastures*—Were very bare until well into the summer. *Live Stock*—Did quite well, though cattle were somewhat short in the forepart of the season. Cattle and sheep were generally free from disease, though mastitis was prevalent amongst dairy cows, and some loss arose through mineral deficiency amongst breeding (beef) stock; there was a successful lambing season. *Clip of Wool*—Average and of fair quality.

BERWICKSHIRE (Lammermoor). *Wheat*—Considerable decrease in acreage; 38 to 40 bushels per acre; quality poor; seed sown, 4 bushels per acre. *Barley*—30 to 42 bushels per acre; quality fair and yield rather better than last year; seed sown, $2\frac{1}{2}$ to $3\frac{1}{2}$ bushels per acre. *Oats*—Slight decrease in acreage; average, 40 to 50 bushels per acre; quality only fair; seed sown, 5 to 6 bushels per acre. *Harvest*—Cutting began generally in first week of September, but little real progress until about the 17th owing to heavy rain; a very good spell beginning on the 23rd saved the situation; there were about sixty combines at work in the county. *Hay*—Some good hay made in the first week of July, after which the weather broke and good hay was very difficult to get; a short crop. *Meadow Hay*—A poor crop and much of it spoilt in the making. *Potatoes*—Much better than last year; 7 to 10 tons per acre; leaf-roll prevalent to an alarming extent; few if any stock seed certificates obtained; blight developed later and unsuitable weather interfered with spraying; acreage similar to 1945. *Turnips*—Good weather for cleaning the land; turnips brairded very badly owing to drought and frost; some were sown three times; beetle dust was used successfully in some cases to counter attacks by fly; made good progress in the autumn, but finished below average. *Insects*—Little if any damage except by turnip-fly. *Weeds*—Runches and day nettles probably more prevalent than usual; modern selective weed-killers coming into use. *Pastures*—A very dry spring checked the growth of grass, and pastures remained very bare all summer; grass grew well in the back-end of the year. *Live Stock*—Did very well all summer; cattle were healthy, and losses among sheep were perhaps under the average. *Clip of Wool*—Low-ground clips were average as regards weight and quality; hill sheep average as to weight, but hogg wool hardly so good in quality.

ROXBURGHSHIRE. *Wheat*—A nice standing crop which threshed well, approximately 48 bushels per acre; grain was of good quality while the straw was under average for quantity; seed sown in autumn, 3 to 4 bushels per acre, and rather less for spring varieties. *Barley*—Good crop, although much damage was done by a high gale stripping many heads off; 70 bushels per acre, the highest yields being from Maja and Abed Kenia, although the straw of these two varieties was definitely of small weight; seed sown, from $2\frac{1}{2}$ to almost 4 bushels per acre. *Oats*—A good standing crop with few lodged fields; yield and quality both good; straw was not

very great on many farms; grain from 40 to over 80 bushels per acre; a remarkable improvement was recorded where marginal land was top-dressed; seed sown, from 4 to $5\frac{1}{2}$ bushels per acre. *Harvest*—Early farms had a very bad spell of weather, and on these farms little grain was secured unweathered; the late farms had an exceptionally good turn of weather and had almost a record, in many cases getting their crops in in first-class order. *Hay*—Weather conditions were good for reasonably early haymaking and much was secured in first-rate condition; the yield in many cases was little more than about 25 cwt. per acre. *Meadow Hay*—A large acreage was more or less spoiled by bad weather. *Potatoes*—A very large crop lifted in good condition; a considerable shortage of certified seed owing to leaf-roll, &c.; kept reasonably well in the pits. *Turnips*—A very mixed crop, being resown three or four times; a favourable autumn extending to the end of December largely saved the situation; not much disease reported. *Insects*—No injury worth recording, except for turnip-fly, which was very bad. *Weeds*—Rather less noticeable, as the dry spell in the early summer allowed them to be kept in check, although some did get away in the wet weather during early harvest. *Pastures*—Were burned up until early August, but came away later, and although never full, improved considerably. *Live Stock*—In spite of bare pastures did well, and there were very few accounts of any disease; on a number of farms cattle pastures were very bare, and cattle did not summer too well; some trouble with suckler cows and grit ewes, but not very serious. *Clip of Wool*—Just a little over average in weight and quality.

SELKIRKSHIRE. *Wheat*—Very little grown. *Barley*—34 to 48 bushels per acre; crops fairly good and stood well, but yields very erratic, some fields having braided badly were late in ripening; seed sown, $3\frac{1}{2}$ bushels per acre. *Oats*—An increased acreage sown; yield, 38 to 48 bushels on later and higher fields, 45 to 56 bushels on the better land; seed sown, 5 to 6 bushels per acre. *Harvest*—Commenced a week later than usual; weather could not have been much worse, and for a time cutting by tractor was impossible on account of the sodden state of the fields; late crops fared best, but the grain was badly discoloured; many samples were of poor natural weight; straw of very inferior feeding quality. *Hay*—Very light generally; if cut early, was secured in good order, but if late cut was badly weathered. *Meadow Hay*—Fair; much of it not secured on account of continuous rain. *Potatoes*—Yield considerably less than last year; 5 to 7 tons per acre; very little disease; no new varieties planted. *Turnips*—A fair average, but prospects looked bad for a long time; the first sown braided badly on account of cold weather; resowing required in many cases; yellows did better than swedes; yield, 10 to 20 tons per acre. *Insects*—Turnip-fly did a lot of damage early in the season. *Weeds*—Owing to labour shortage, were not kept down as they should have been. *Pastures*—A very poor grazing season. *Live Stock*—Did fairly well, but store lambs lacked condition of former years. Cattle and sheep generally were free from disease. *Clip of Wool*—Average and of good quality.

PEEBLESSHIRE. *Wheat*—Not extensively grown, but quite an average crop; average, 40 to 44 bushels per acre; much grain lost through over-ripeness; quality poor on account of sprouting; seed sown, $3\frac{1}{2}$ bushels per acre. *Barley*—Good crops, but badly twisted in places; average, 40 to 44 bushels per acre; poorer land, from 34 to 38 bushels per acre; seed sown, from about 4 bushels per acre. *Oats*—Generally fairly good, although some parts suffered from grub; in the early districts much lost through over-ripeness before cutting; early cut grain damaged by sprout-

ing ; yield below average, 44 to 60 bushels per acre ; high districts, 30 to 38 bushels per acre ; seed sown, 5 to 5½ bushels per acre. *Harvest*—Commenced about usual time ; weather during early part was very bad ; cutting was held back and crops became over-ripe ; much grain was lost by growth in the stooks ; late districts fared much better, and crops well secured. *Hay*—Quantity per acre below average ; quality where well secured was quite good ; a good proportion was of inferior quality. *Meadow Hay*—Was decidedly below average, and on high late land much was not secured. *Potatoes*—Very good crop and of excellent quality. *Turnips*—In general well below the average ; a bad braird and very unequal ; quite a lot of resowing, sometimes as many as three times. *Insects*—Turnip-fly was very severe on new-braided plants and caused a lot of damage. *Weeds*—No worse than usual. *Pastures*—Owing to the cold late spring grass was much later in coming than usual, and with the prolonged cold drought was very poor till about mid-summer. *Live Stock*—Throve well where there was sufficient food, but where pastures were burned and bare did not do so well as usual. Cattle and sheep generally were free from disease. *Clip of Wool*—Good quality ; quantity slightly below average.

DUMFRIES DISTRICT.

DUMFRIES (Annandale). *Wheat*—Acreage similar to previous year ; good crop on suitable land, but threshed out a poor sample ; 20 cwt. per acre ; seed sown, 4 bushels per acre. *Barley*—Large acreage grown ; not as good a sample as usual, but was not so badly weathered as other grain crops ; 20 to 24 cwt. per acre ; seed sown, 2½ to 3 bushels per acre. *Oats*—Acreage similar to last year ; a good crop on well-farmed land, and threshed out better than last year, but much discoloured owing to weather conditions ; 55 to 60 bushels per acre on good land ; 40 to 45 bushels in higher districts. *Harvest*—Started third week in August and finished about third week in October ; proved one of the worst on record ; cutting and carting much prolonged with much sprouting in the stook. *Hay*—Ryegrass about average ; well got in the early part of the season, but much was spoiled later on ; 30 to 40 cwt. per acre. *Meadow Hay*—Lighter ; mostly very badly got owing to poor weather conditions ; 20 to 30 cwt. per acre. *Potatoes*—Above average ; mostly lifted in good condition ; very little disease ; a good deal of leaf-roll in some varieties ; usual varieties planted with perhaps a larger acreage of earlies than usual ; 8 to 9 tons per acre. *Turnips*—About average on most farms ; a great deal of damage caused by turnip-fly, but where resown they seemed to do well ; 16 to 17 tons per acre. *Insects*—Damage was greater than usual, principally by turnip-fly. *Weeds*—Owing to the season and shortage of labour annual weeds were very plentiful. *Pastures*—Worse grazing season than last year owing to a cold dry May and June and too much wet afterwards. *Live Stock*—Did not thrive so well as usual owing to shortage of grass and lack of sun. Cattle and sheep generally were free from disease. *Clip of Wool*—Good quality and weight about average.

DUMFRIES (Nithsdale). *Wheat*—None grown. *Barley*—None grown. *Oats*—Early cut were very good, but badly spoiled by the prolonged broken weather ; had on the average to stand about five weeks before being stacked ; late cut well got ; threshed very well in spite of much shedding. *Harvest*—Lasted for two months ; started generally by 16th August ; bulk of it not well got. *Hay*—Very light crop, well got in most

cases. *Meadow Hay*—Also a light crop; first of it weathered, but last out well got only to be weathered in ricks by incessant rain. *Potatoes*—Heaviest crop for years, and not many smalls; a little more disease than last year; about 8 tons per acre. *Turnips*—Good on some farms, but on the average a poor crop; a good lot of resowing owing to drought and fly; 12 to 16 tons per acre; stored in dirty wet weather. *Insects*—More turnip-fly than usual. *Weeds*—Came away strongly in August. *Pastures*—Not so good as last year. *Live Stock*—Cattle did not do so well as last year. Cattle and sheep free from disease except for trembling, &c., in ewes and lambs. *Clip of Wool*—Good; about same as previous year.

DUMFRIES (Eskdale). *Wheat*—None grown. *Barley*—None grown. *Oats*—Lea oats mostly a fair average, but many of the crops badly laid and twisted; sown-out oats mostly very short and thin; crops were very varied, but, threshing out well, gave a better yield than was expected. *Harvest*—Started about the usual time; for about a month or six weeks rain protracted the harvest, and much was secured in very bad condition; later places got theirs in very good order. *Hay*—Ryegrass hay was a good average, mostly got in good condition, but any farm late in starting had very bad weather, and a good deal was wasted. *Meadow Hay*—Practically a wash-out; any small lot obtained was in very poor condition, probably the worst season on record. *Potatoes*—Were good and had not much disease; no new varieties planted. *Turnips*—Varied very much; some farms had a nice crop of small roots, while others had practically none at all; the braird was all right, but the weather too wet and cold after singling; not much to resow. *Insects*—Very little damage, less than usual. *Weeds*—Many crops got dirty owing to the constant wet weather. *Pastures*—Less than average growth; quality not so good as usual on account of too much wet and no sun. *Live Stock*—Did well on pasture; much better than expected in such a cold wet season. Both cattle and sheep were very free from disease; there were fewer deaths amongst sheep than for many years. *Clip of Wool*—Quality and weight was about average; some farms were long in finishing clipping owing to wet weather, and some wool was difficult to keep clean.

KIRKCUDBRIGHTSHIRE. *Wheat*—Very small acreage; about 17 cwt. per acre. *Barley*—A very much reduced acreage grown. *Oats*—Acreage similar to 1945; some very heavy crops secured, and even with the long-drawn-out harvest yields were excellent; about 40 bushels per acre. *Harvest*—On early farms cutting started during the second week in August; on 27th August the weather broke down for over three weeks; it did not really settle until 8th October, when a dry spell for a month followed; amount of grain wasted was small considering the protracted harvest. *Hay*—That made during the second week of July was excellent; afterwards there was no opportunity for making; fair yield of 35 cwt. per acre. *Meadow Hay*—Practically no good crops secured; yield, 30 cwt. per acre. *Potatoes*—Acreage similar to last year; a really excellent crop, the best for many years; 8 to 10 tons per acre; disease not prevalent. *Turnips*—The cold dry spell during May and first half of June caused very slow growth; turnip-fly or beetle very prevalent and many crops had to be resown several times; on the whole the worst turnip season for over twenty years; average yield, 12 tons per acre. *Insects*—No report of damage. *Weeds*—No report. *Pastures*—Keep for stock was very short during the early part of the summer owing to the dry cold weather; from July onwards grass was plentiful. *Live Stock*—Did well. *Clip of Wool*—Similar to last year.

WIGTOWNSHIRE. *Wheat*—Very little grown. *Barley*—Very little grown. *Oats*—Seed-bed fairly good and oats braided well, but were checked by dry weather in April and well into May; grain well filled and very little laid; possible average, 44 to 46 bushels per acre. *Harvest*—Started early; crops stood up well and cutting was accomplished without much trouble; early farms got a good quantity stacked before the weather broke; after that broken weather for at least a fortnight spoiled much grain; later crops secured in very moderate condition; weather improved afterwards, and those who were very late had a splendid harvest. *Hay*—Owing to dry weather in April and May did not promise well, but turned out better than expected; about 2 to 2½ tons per acre; it was got in good condition, though weather was more broken in the early part of the hay harvest. *Meadow Hay*—More productive than previous year, and secured in good order. *Potatoes*—Earlies showed a poor yield at first, but improved later to 6 to 8 tons per acre; some districts suffered from frost; the digger was much used, and German prisoners of war helped to augment the labour; later were a very good sound crop, and the weather was very good for lifting. *Turnips*—Early sown turnips either did not braid owing to drought or were killed by frost; resowing two and three times was common; therefore with a late start they have been a very moderate crop; average crop per acre difficult to estimate; not much disease. *Insects*—Very little damage done except to any braid that came up in early May. *Weeds*—Dockens and thistles prevalent, redshank strong in August; on some farms weed-cutting neglected; where turnips were sown late, fields were cleaner. *Pastures*—Bare in early spring and summer owing to drought; later they improved; aftermath and young grass after harvest very good. *Live Stock*—Generally did fairly well, everything considered, but a little hand feeding would have made a great difference; sheep and young stock throve well and were in good condition. There was about the usual illness among stock; not so much grass sickness; mastitis still prevalent, but efforts being made to conquer it; penicillin now used with some success; hoose was bad in many places, many calves being lost. *Clip of Wool*—Average quality and quantity.

GLASGOW DISTRICT.

AYRSHIRE. *Wheat*—Grain, 22 cwt. per acre; straw, 20 cwt. per acre; below average, due to prolonged drought during spring and summer; earlier districts secured in good condition; seed sown, 4 bushels per acre. *Barley*—Very little grown; grain and straw below average. *Oats*—Average crop, but considerably below average in quality; grain 15 cwt., straw 12 cwt. per acre; large proportion of light grain and moisture content very high. *Harvest*—Earlier than usual owing to drought, but very protracted; cutting commenced end of July in earliest districts, but September rains ruined 50 per cent of most crops; condition of both grain and straw very moderate. *Hay*—Very light owing to drought; about 25 cwt. per acre; well secured; clover not plentiful. *Meadow Hay*—Below average in quantity, but above in quality. *Potatoes*—Below average due to drought, especially among early lots; yield, 5 tons per acre; very little disease owing to dry season; almost no new varieties tried. *Turnips*—Very poor; worst crop for years; in some cases a total failure; two or three sowings necessary in many cases; about 10 tons per acre. *Insects*—Only crop to suffer was turnips; great and extensive damage by turnip-fly. *Weeds*—Much less prevalent than usual. *Pastures*—Matured early, but lack of moisture during late spring and all summer

kept fields bare. *Live Stock*—Bad grazing season for all classes of stock ; health of cattle and sheep about normal ; hoose in calves very prevalent from August onwards. *Clip of Wool*—Below average in quantity and quality.

BUTE. *Wheat*—None grown. *Barley*—None grown. *Oats*—Very good except on light soil, where the dry weather in May and June affected the growth ; grain, about 20 cwt. per acre. *Harvest*—Specially favourable for the very early and very late farms ; a very wet September caused much sprouting and discoloured grain. *Hay*—Lighter than last year ; 25 cwt. per acre. *Meadow Hay*—Very little grown. *Potatoes*—On medium soil earlies produced about 14 tons per acre ; on lighter soil about 7 tons per acre ; lates 10 tons per acre ; very little disease ; no new varieties grown. *Turnips*—15 tons per acre ; one of the worst braids on record ; some plots sown three times owing to fly. *Insects*—No very extensive damage recorded. *Weeds*—A few fields affected by charlock. *Pastures*—Grass not so good as last year owing to dry weather in early summer. *Live Stock*—Did fairly well ; there were quite a few cases of udder clap ; maggot not so bad. *Clip of Wool*—Up to average.

ARRAN. *Wheat*—None grown. *Barley*—None grown. *Oats*—40 to 50 bushels per acre ; straw, 20 to 30 cwt. per acre. *Harvest*—Began mid-August ; very prolonged through bad weather ; the crop suffered badly. *Hay*—Only moderate ; 30 to 40 cwt. per acre. *Meadow Hay*—Much about the same as last year. *Potatoes*—Extra good ; excellent harvest conditions ; much better than previous years, 9 to 12 tons per acre ; little disease ; some new varieties were planted and gave excellent results. *Turnips*—Not so good ; had to be resown several times ; 15 to 20 tons per acre. *Insects*—No damage reported ; trouble caused by vermin as usual. *Weeds*—Caused no injury if kept under control. *Pastures*—Good where top dressed, but unfortunately not enough attention was paid to grassland. *Live Stock*—Did quite well. Cattle and sheep generally were free from disease. *Clip of Wool*—About average.

LANARKSHIRE (Upper Ward). *Wheat*—Very little grown ; not suitable for milling. *Barley*—Not much grown. *Oats*—40 to 65 bushels per acre ; quality of straw and grain moderate ; seed sown, 5 to 6 bushels per acre. *Harvest*—Started at usual time, but was very protracted by weather ; those that were late had better conditions. *Hay*—1½ to 2½ tons per acre ; mostly secured in good order. *Meadow Hay*—Good crop, well secured. *Potatoes*—6 to 8 tons per acre ; lifted under ideal conditions for keeping ; very little disease ; no new varieties planted. *Turnips*—A fair crop ; some resowing owing to dry weather, but grew well in back-end. *Insects*—No injury reported. *Weeds*—More plentiful and difficult to control, owing to bad weather and scarcity of labour. *Pastures*—Bare during summer, but very good at back-end. *Live Stock*—Throve well ; cattle and sheep free from disease. *Clip of Wool*—Quality fair ; under average crop.

LANARKSHIRE (Middle and Lower Wards). *Wheat*—Grain, 18 cwt. per acre ; straw, 23 cwt. per acre ; better crop than last year, considerably damaged by weather ; grain lost by shedding. *Barley*—Very little grown. *Oats*—Grain, 19 cwt. per acre ; straw, 22 cwt. per acre ; mostly badly damaged. *Harvest*—Badly delayed by adverse weather ; secured in poor condition. *Hay*—1 ton 16 cwt. per acre ; some in exceptionally good condition due to a short spell of very fine weather ; some slightly damaged. *Meadow Hay*—Very little grown. *Potatoes*—8 tons per acre ; a little more

than last year; not much disease; no new varieties grown. *Turnips*—18 tons per acre; braided unevenly; some second and third sowings caused by attacks of fly. *Insects*—Turnips more damaged by flea beetle than usual. *Weeds*—Excessive wet periods favoured their growth, and some root crops were adversely affected. *Pastures*—Not so good as in previous year. *Live Stock*—Did not thrive so well as last year; many milking herds were earlier housed. Disease was not more evident than last year; considerable reduction noted in attacks by maggot-fly on sheep. *Clip of Wool*—Better than last year.

RENTREWSHIRE. *Wheat*—Good crop growing, but very indifferent when harvested, due to bad weather; yields variable, from a few cwt. to 30 cwt. per acre, depending entirely on the luck at harvest; seed sown, 3 to 4 bushels per acre. *Barley*—None grown. *Oats*—Above average, but with much loss and damage at harvest time; yields variable, from 20 to 30 cwt. per acre, depending on harvest weather; straw, good bulk, about 20 to 30 cwt. per acre. *Harvest*—Commenced on 8th August, three days earlier than last year; proceeded well until 28th August, when weather completely broke down; on the few dry days in September much hutting was done, and it was the first week in October before stacking was resumed; October was excellent for weather, and the last of the grain was stacked by about the 15th of that month; much of the grain was seriously damaged, but very little was a total loss. *Hay*—Average, 2 to 2½ tons per acre, and where acreages were small secured in fair order; those with large crops and those short of labour had part spoiled by bad weather. *Meadow Hay*—Little grown and badly damaged; in some cases entirely lost due to excessive rainfall; yield, about 20 cwt. per acre. *Potatoes*—A record crop, up to 15 tons per acre; from 12 to 14 tons of second earlies and Kerr's Pink common; good weather in October enabled crops to be dug in good order and as cheaply as the high wages for casual labour would allow; disease appeared at beginning of September, but did not reach the tubers, and no serious damage was reported; no new varieties extensively grown. *Turnips*—Good; 20 to 25 tons per acre, but some loss occurred from rot due to wet weather; braided very slowly, and successive sowings mostly came to the hoe at the same time; no second sowings required. *Insects*—Not troublesome. *Weeds*—Not so prevalent as in previous years due to dry spring, which checked growth and enabled cultivation to keep ahead. *Pastures*—Scarce in early part of year due to cold dry weather; came away later and grazed well right on to December. *Live Stock*—Throve moderately well, making allowance for poorer condition on going out to grass due to scarcity of winter keep; no outbreaks of disease among cattle and sheep reported. *Clip of Wool*—Average for quality and quantity.

ARGYLLSHIRE (Lochgilthead). *Wheat*—None grown. *Barley*—Very little grown. *Oats*—Average; grain, 30 to 36 bushels per acre; straw, 20 cwt. per acre; quality of both grain and straw below that of last year owing to weather conditions in September; seed sown, 5 to 6 bushels per acre, according to variety. *Harvest*—Started about the usual time, but was protracted by the phenomenally wet weather in September; considering the difficulties the crop was eventually secured in fair condition. *Hay*—Less bulky than last year owing to lack of rain in May; probably not more than 20 cwt. per acre; quality good. *Meadow Hay*—Less productive; some of it was cut very late. *Potatoes*—Better than last year; 6 to 7 tons per acre, and quality very good; crop lifted under very favourable weather conditions; no disease; no new varieties tried. *Turnips*—

Considerably less than last year; possibly 15 tons per acre; brairding retarded by abnormally dry weather in May; there was no considerable amount of resowing. *Insects*—Not troublesome to any extent. *Weeds*—Less damage than usual owing to dry conditions in spring. *Pastures*—During the season were of average growth and quality compared with last year. *Live Stock*—Did very well; cattle and sheep generally were free from disease. *Clip of Wool*—Average.

ARGYLLSHIRE (Kintyre). *Wheat*—Very little grown; grain, about 25 cwt. per acre; seed sown, $3\frac{1}{2}$ bushels per acre. *Barley*—Better than in 1945, threshed out well; about 20 cwt. per acre; quality of grain and straw very good; seed sown, about 4 bushels per acre. *Oats*—Acreage fairly well maintained; yield much improved on last year; probably about 15 cwt. per acre, ranging from 10 to 25 cwt. per acre; seed sown, 5 bushels per acre; early spring was very dry, but grain filled well in a favourable summer. *Harvest*—Easier to handle than last year; dry spring checked weeds; cutting began early, straw not much tangled; early farms fared best as later ones experienced a bad spell of broken weather; weather good at finish. *Hay*—Ryegrass poor due to dry spring; probably not over 20 cwt. per acre; quality poor. *Meadow Hay*—Fair crop, well secured. *Potatoes*—Above average; blight did not appear till late; practically no spraying done; crops not too early, but very good, and lifted in exceptionally fine weather. *Turnips*—Did well in spite of sowing difficulties; May was a very dry month and many double sowings were necessary; brairded very irregularly, and in many cases two thinnings were necessary; probably 18 to 20 tons per acre. *Insects*—Turnips suffered slightly from attacks of fly; mud beetle also present. *Weeds*—Ragwort very prevalent; charlock not so evident as last year; no spraying done; dockens and rushes much in evidence. *Pastures*—Growth above normal after mid-season, but grass very scarce early on due to dry weather. *Live Stock*—Throve well as soon as weather improved in the spring; no serious outbreaks of disease were reported. *Clip of Wool*—Probably again slightly above average.

ARGYLLSHIRE (Islands of Islay, Jura, and Colonsay). *Wheat*—None grown. *Barley*—None grown. *Oats*—Fairly good; about 42 bushels per acre, 40 lb. per bushel; straw, sound but shorter than usual; seed sown, 5 to 6 bushels per acre. *Harvest*—Began about mid-August, and with interruptions lasted into mid-October; early sowings suffered most from weather; some late crops harvested well; heavy crops were badly laid, but strong winds in October helped harvesting, though much had to be cut by reaper or even by scythe; A.E.C. tractor service cut over 1000 acres; crops were fairly well secured. *Hay*—Light; about 24 cwt. per acre for ryegrass and 35 cwt. per acre for clover. *Meadow Hay*—Lighter than in the average year. *Potatoes*—Exceptionally good in bulk and quality; mainly about $8\frac{1}{2}$ tons per acre; well secured; most farms had a surplus for which no economical market exists locally; disease was absent; no departure from usual varieties. *Turnips*—Again about 15 or 16 tons per acre; roots slightly below average in size; brairded fairly well, but in some cases a second sowing proved necessary from drought. *Insects*—Damage slight and even less prevalent than usual. *Weeds*—Turnips in early growth were retarded by redshank, but later gained mastery. *Pastures*—Backward in spring and early summer and never fully recovered from the check; heavily stocked farms found difficulty, and in some cases ground intended for hay had to be grazed. *Live Stock*—Found sufficient food despite pastures being below average; they had to

be kept on the move, and in few cases was there a surplus of grazing; a mild autumn enabled them to be kept out to a late date. Cattle and sheep kept generally free from disease; maggot trouble in sheep not quite so prevalent; drought in early summer was accompanied by cold winds. *Clip of Wool*—About average in quality and weight.

STIRLING DISTRICT.

DUMBARTONSHIRE (Upper). *Wheat*—Good to start with, but it was spoiled in the stook; about 30 bushels per acre; straw, 35 cwt. per acre, poor quality; seed sown, 3 to 4 bushels per acre. *Barley*—None grown. *Oats*—Average to good condition; 45 bushels per acre; straw, 35 cwt. per acre, quality indifferent; seed sown, 4 to 5 bushels per acre; some sent to millers immediately for early threshing. *Harvest*—Started about usual time, but was unduly protracted by bad weather. *Hay*—About 25 cwt. per acre; quality fair; early cutting damaged by bad weather. *Meadow Hay*—Secured in good condition. *Potatoes*—About 7 tons per acre; blight was very prevalent during latter part of season. *Turnips*—Good, about 25 tons per acre; braird good when early sown, later sowings uneven. *Insects*—Turnip-fly very prevalent and also maggot in the roots at later stages. *Weeds*—Redshank was very strong in wet fields. *Pastures*—Poor in early season, but improved later. *Live Stock*—Did poorly up to early July, then improved slightly; all stock fairly free from disease. *Clip of Wool*—Average quality, and about usual weight.

DUMBARTONSHIRE (Lower). *Wheat*—Average yield 40 bushels per acre, 57 lb. per bushel; straw, about 28 cwt. per acre; well grown, but harvesting conditions unfavourable, making quality of the grain poor and a large percentage unsuitable for milling; seed sown, $3\frac{1}{2}$ bushels per acre. *Barley*—None grown. *Oats*—Sown under good conditions; growth regular and healthy; yield of grain and straw good, 45 bushels of grain per acre, 37 lb. per bushel; straw, about 24 cwt. per acre; quality of grain and straw poor; seed sown, $5\frac{1}{2}$ bushels per acre. *Harvest*—Commenced about the usual time; conditions good to begin with, but deteriorated during September, and stormy wet weather continued for five weeks; operations were difficult and prolonged; grain, especially wheat, sprouted badly, and quality of straw poor. *Hay*—Ryegrass and clover rather heavier than last year; about 46 cwt. per acre; quality mixed; about 30 per cent of the crop badly weathered. *Meadow Hay*—Heavier than in 1945, but quality not so good. *Potatoes*—Yield up by about 30 cwt. per acre from last year; average about 8 tons 15 cwt. per acre; blight showed in middle of September, but did not seriously affect it; no new varieties were planted. *Turnips*—Swedes and yellows rather under last year's yield, and averaged about 16 tons 10 cwt. per acre; braird rather patchy, and resowing necessary in a few places. *Insects*—Very little damage by pest or insects reported; turnip-fly beetle was noticeable, but did less damage than usual. *Weeds*—Damage very slight with the exception of that to turnip fields, where redshank became troublesome during the latter part of the summer. *Pastures*—Were bare during the earlier part of the grazing season, but improved from July onwards, and lasted well into the autumn. *Live Stock*—Made good progress in grazing, and finished in good condition; there were no pronounced epidemics amongst cattle or sheep during the season. *Clip of Wool*—Quality was good and a little heavier than in 1945.

STIRLINGSHIRE (West). *Wheat*—Very little grown. *Barley*—Very little grown. *Oats*—Above average; grain, 18 cwt. per acre; excellent growing crops, but very badly damaged by weather at harvest; very few good samples secured; seed sown, 5 bushels per acre. *Harvest*—Started usual time, but prolonged much beyond average, due to weather; much grain lost by shedding; much discoloration; more huts or rickles seen in the fields this year than in any previous year. *Hay*—About 30 cwt. per acre; that secured in one good week in excellent quality, quality of remainder poor. *Meadow Hay*—Average production; very badly spoiled by weather. *Potatoes*—Yield improved; 8 tons per acre; little disease; kept well in pits except in some places where extreme frost caused some loss. *Turnips*—16 tons per acre; quality good; braird very slow due to May drought; not much resowing. *Insects*—No damage to report. *Weeds*—Less damage than usual; persicaria in green crop prevalent; charlock in cereals spreading, but in most cases treatment applied successfully. *Pastures*—Very bare in spring due to drought; after rain in July quality and quantity very good. *Live Stock*—Did very well; less mastitis than usual. Intestinal parasites and liver fluke more prevalent than usual both in cattle and sheep; pregnancy toxæmia and lambing sickness in ewes less troublesome. *Clip of Wool*—Average in quality and quantity.

STIRLINGSHIRE (East). *Wheat*—30 bushels per acre; straw, 25 cwt. per acre; quality not so good as last year except when secured before the weather broke at end of August; some lots were beautiful samples, and threshed out to 40 bushels per acre; seed sown, 4 bushels per acre. *Barley*—25 to 35 bushels per acre; straw, 20 cwt. per acre; quality poor, owing to weather; seed sown, 3 to 4 bushels per acre. *Oats*—40 to 50 bushels per acre; straw, 25 cwt. per acre; seed sown, 5 to 6 bushels per acre. *Harvest*—Started 10th August, and cutting went well until the 26th; then weather broke down, and much grain sprouted and was lost; a record harvest if weather had been favourable. *Hay*—Ryegrass and clover fair, and early haymakers got it in good order; all secured after the 15th of July was more or less weathered; ryegrass, 30 cwt. per acre; timothy, 65 to 75 cwt. per acre. *Meadow Hay*—Average crop, secured with great difficulty, and much discoloured; 25 cwt. per acre. *Potatoes*—Much better than last year; 10 to 12 tons per acre; tubers large size and with little disease; no new varieties grown; all kept well in the pits. *Turnips*—20 to 25 tons per acre; a good deal of resowing necessary, as brairds were slow and uneven, but crop bulked out well in autumn. *Insects*—No grub in the oats, but turnips seemed to suffer from fly more than last year. *Weeds*—Charlock and spurrey got out of hand among turnips slow in brairding; other crops clear. *Pastures*—A very good March brought grass away early, but it wilted at the end of May with withering winds; recovered again in July and did well. *Live Stock*—Did wonderfully; although some ground suffered from the wet, the good October made amends, and cattle finished up well; no udder clap amongst dairy stock, but mastitis was prevalent; also maggot reported amongst sheep. *Clip of Wool*—Quality and quantity about average.

CLACKMANNANSHIRE. *Wheat*—Did very well, but perhaps less sown on driffield farms; 32 to 48 bushels per acre, some claiming as much as 56 bushels per acre; straw, 20 to 25 cwt. per acre; seed sown, 4 bushels per acre; considerable damage to wheat in stook during the wet weather. *Barley*—Good, 40 to 50 bushels per acre; straw, 15 to 20 cwt. per acre; some sprouted grain; seed sown, 3 to 4 bushels per acre. *Oats*—Suffered from dry cold weather in spring, but made a good recovery and finished

a grand crop, to be badly destroyed by the wet harvest; 40 to 50 bushels per acre; straw, 15 to 25 cwt. per acre; much badly discoloured; seed sown, 4 to 6 bushels per acre according to variety. *Harvest*—Began about the middle of August; grain combined then secured in excellent condition; weather broke on 28th August, and continued mild and wet till about 20th September, and stooked grain sprouted very badly; wheat suffered most; grain cut later was not sprouted; had the weather been average, 1946 would have been a record for yields. *Hay*—Ryegrass and clover 10 cwt. per acre less than last year owing to lack of rain and growing weather in May; 30 to 35 cwt. per acre; timothy up to 4 tons per acre; much hay discoloured in the making due to wet weather. *Meadow Hay*—Little grown. *Potatoes*—Kerr's Pink up to 10 tons per acre; Redskin up to 13 tons per acre; Golden Wonder very disappointing, 3 to 5 tons per acre; all lifted in excellent condition; some disease reported. *Turnips*—Slow in coming to the hoe, mainly due to the dry weather; this and turnip-fly beetle caused considerable resowing; finished up well at 15 to 25 tons per acre; remarkably free of disease. *Insects*—Turnip-fly beetle and leather-jacket grub in oats did some damage. *Weeds*—Little damage recorded. *Pastures*—Grass came slowly with little growth to spare till the turn of the year; it continued well into autumn. *Live Stock*—Cattle and sheep thrived well in the latter part of the year, and were free from disease. *Clip of Wool*—A good average.

PERTH DISTRICT.

PERTSHIRE (Central). *Wheat*—Good crop, 40 to 48 bushels per acre; straw, 30 to 35 cwt. per acre; very bad weather caused growing in the stook; about one-third of crop fit only for stock-feed; seed sown, $3\frac{1}{2}$ to 4 bushels per acre. *Barley*—Yield good, 36 to 52 bushels per acre; straw, 15 to 20 cwt. per acre; not too badly wasted by weather; seed sown, 3 to $3\frac{1}{2}$ bushels per acre. *Oats*—Probably a record return but for the constant bad weather at harvest; some fields so badly sprouted as to be unthreshable; yield, 20 to 80 bushels per acre; straw, 20 to 35 cwt. per acre; seed sown, 5 to 7 bushels per acre. *Harvest*—Started about second week in August; weather at first was fairly good, but small percentage of crop secured in good order; 4 to 5 weeks of rain and floods followed; late districts had less waste. *Hay*—Light, owing to very dry April and May; 15 cwt. to 2 tons per acre; only a few good days to secure the crop; stacking weather very broken. *Meadow Hay*—Good crop, but owing to weather very little was secured. *Potatoes*—Exceptionally good; 7 to 12 tons per acre; very little disease except in some earlies; Home Guard, a first early, came more into favour; weather very favourable for lifting. *Turnips*—Poor yield in most cases; 12 to 20 tons per acre; quality good; owing to very dry barren weather in May and prevalence of turnip-fly beetle, a great many fields had to be resown, in some cases twice. *Insects*—No serious damage except in turnips, which were badly eaten by the turnip-fly beetle. *Weeds*—Troublesome in July and August in the green crop, there being no dry spell in which to kill them off. *Pastures*—Very poor and bare until the rain in June, but grazed exceptionally well in the autumn. *Live Stock*—Did very well in the second half of the season; generally free from disease, except for grass sickness in horses and some bracken poisoning in cattle. *Clip of Wool*—Good average.

FIFESHIRE (Middle and Eastern). *Wheat*—32 to 40 bushels per acre; straw, about 30 cwt. per acre; seed sown, 3 to 4 bushels per acre. *Barley*

—Very heavy ; from 40 to 64 bushels per acre ; straw, 20 to 30 cwt. per acre ; seed sown, $2\frac{1}{2}$ to $3\frac{1}{2}$ bushels per acre. *Oats*—40 to 80 bushels per acre ; very irregular, possibly owing to very cold dry spring ; straw, much shorter than last year's in many cases ; 20 to 30 cwt. per acre ; seed sown, about 5 bushels per acre. *Harvest*—Started about usual time, but bad weather caused a lot of sprouting in oats and wheat ; it did not finish until beginning of October. *Hay*— $1\frac{1}{2}$ to 2 tons per acre, lighter than last year ; secured in good condition. *Meadow Hay*—None grown. *Potatoes*—Good, but not much heavier than last year ; 6 to 10 tons per acre ; a large number of crops refused seed certificate on account of the large proportion of leaf-roll. *Turnips*—Swedes, although slow in brairding, grew into a very big sound crop free from disease ; 20 to 30 tons per acre ; some resowing on account of turnip-fly damage ; on the whole a much bigger and sounder crop than last year. *Weeds*—Not so bad as last year ; the new dressings to control munch, charlock, and wild tares a great success. *Pastures*—Were very bare in spring owing to the dry weather, but came on better later. *Live Stock*—Throve well on the pastures ; cattle and sheep generally were free from disease. *Clip of Wool*—Average.

FIFESHIRE (Western). *Wheat*—Acreage again slightly reduced ; brairds irregular, but yields average ; 36 to 40 bushels per acre ; rust not troublesome ; seed sown, 4 bushels per acre ; proportion of straw to grain, average. *Barley*—Reduced acreage sown under good conditions, but owing to continued dry spell after sowing brairds irregular ; 40 to 44 bushels per acre ; few laid crops ; seed sown, 2 to 4 bushels per acre. *Oats*—Sown under ideal conditions ; good crop generally on early ploughed land, but where land was ploughed late brairds very irregular and crop never bulked ; yields on high land, 40-48 bushels per acre ; on better land up to 68 bushels per acre. *Harvest*—One of the worst on record, resulting in much sprouted and spoiled grain and poor quality straw ; started middle of August ; weather broke before the end of the month and continued bad till third week in September ; throughout the season cutting almost impossible except with power-driven binders. *Hay*—Good weather at beginning of season resulted in a lot of good quality hay being made, but owing to lack of rain in April and May yields were reduced, and in many cases did not exceed 30 cwt. per acre ; in later districts quality and yields below average ; 25 cwt. per acre. *Meadow Hay*—Not much grown ; reasonably well got. *Potatoes*—Above average, 6 to 8 tons per acre ; 2 tons more than last year ; planting and lifting carried out under ideal conditions and uninterrupted by weather ; leaf-roll very prevalent, and some seed lots turned down owing to this disease ; blight not so apparent as last year. *Turnips*—Brairds very irregular and crops below average owing to continued dry weather after sowing ; 12 to 16 tons per acre ; some second sowing reported ; slight insect damage. *Insects*—Generally little damage done. *Weeds*—Less troublesome and more easily controlled owing to dry weather in early part of season. *Pastures*—Came away well in early spring, but growth severely checked by lack of moisture, many bare and burnt fields being noticeable ; in some cases dairy cows were reported grazing seeds intended for hay ; grass remained scarce throughout the season. *Live Stock*—Did not do so well on pastures ; cattle that went out lean in the spring took a long time to make up. No disease reported among cattle and sheep. *Clip of Wool*—Average.

PERTSHIRE (Eastern). *Wheat*—Good ; not so bulky as last year, but threshed out a little better ; 38 to 48 bushels per acre ; seed sown, 3 to 4 bushels per acre ; samples not good owing to sprouting in the stook.

Barley—Good on good land, but samples very variable and mostly weathered; seed sown, 3 to 4 bushels per acre; yield, 40 to 48 bushels per acre. *Oats*—Average crop, which stood well and threshed very well; 54 to 70 bushels per acre; seed sown, 4 to 6 bushels per acre. *Harvest*—Started about usual time, early August; was well advanced when the weather broke; earliest farms fared worst, as it rained, more or less, for a month with absolutely no wind; sprouting started; some newer varieties of wheat were growing green on the top; some oats also were badly sprouted; later farms fared better, but samples of all grain were poor. *Hay*—Light owing to the spring drought from end of March to end of May; during April severe frost checked growth; 40 cwt. per acre; mostly ryegrass; quality good if cut early, but later hay suffered from weathering. *Meadow Hay*—Average crop; quality poor. *Potatoes*—Very good; highest yield for years; up to 12 tons per acre; early varieties suffered from disease owing to the wet weather; later varieties freer from disease; some kept badly in pits although lifted in good condition; the very few new kinds grown yielded very well. *Turnips*—Moderate; slow to braird and those early sown killed by frost; a lot of resowing; crop smaller than last year; about 20 tons per acre; “finger-and-toe” spreading; Wilmansburgher, a green-top swede, was a favourite as capable of resistance to this scourge. *Insects*—Only damage was by the turnip-fly, which was rather troublesome. *Weeds*—Caused no injury, but wild tares spread among grain crops; it was difficult to kill owing to its small leaves being unaffected by spraying. *Pastures*—Owing to the early drought, grass was kept bare by the stock until well into the summer; it lasted into October. *Live Stock*—Throve fairly well despite the cold spring and shortage of grass, and did well in late summer; cattle and sheep free from disease. *Clip of Wool*—Average and of good quality.

PERTHSHIRE (Western). *Wheat*—Average acreage: some crops resown in spring; yield under average in both straw and grain; seed sown, 4 bushels per acre. *Barley*—Not much sown; average crop; seed sown, 3 to 4 bushels per acre. *Oats*—Good average crop; backward in early spring, but improved exceptionally well in early June; yield of grain would have been unusually good but for harvest losses; 40 to 60 bushels per acre; crop stood well; seed sown, 5 to 6 bushels per acre. *Harvest*—Commenced about usual time; one of the worst for many years; much grain stood in stocks for six weeks; a spell of good weather at beginning of October made late crops the best and allowed fields to be cleared of damaged grain. *Hay*—Ryegrass hay light owing to cold spring; secured in very good order; 30 to 40 cwt. per acre; timothy, average, 70 to 80 cwt. per acre; not so well secured as ryegrass. *Meadow Hay*—Not so much secured owing to broken weather; average crop. *Potatoes*—2 tons per acre above average; some crops 12 to 14 tons per acre; a larger number than usual were turned down a grade on inspection; not much disease; crop kept fairly well in pit except where damaged by severe frost in January and February; new variety, Home Guard, yielded well. *Turnips*—Under average, 20 to 30 tons per acre; good quality; braird very irregular; some resowing. *Insects*—Very little damage done. *Weeds*—Not so bad as usual. *Pastures*—Very slow to start; great scarcity of grass at beginning of June; quality good in summer and autumn. *Live Stock*—Throve well after a poor start. Cattle and sheep free from disease except where poisoned by burning of military stores; the entire stock of many farms had to be destroyed and grazings left vacant for summer months; the worst blow to stock owners for many years, as there was great difficulty in getting compensation from the Government. *Clip of Wool*—Average in quantity and quality.

PERTSHIRE (Highland). *Wheat*—Not generally sown; only a few acres on suitable farms. *Barley*—In most cases fair; about 36 bushels per acre; seed sown, about 4 bushels per acre. *Oats*—Average acreage sown; yield, average; natural weight about 42 lb. per bushel; seed sown, 6 bushels per acre. *Harvest*—Began in the middle of August, but owing to weather conditions was not finally completed until end of September; where laid, grain and straw were inferior in quality. *Hay*—Average and of fair quality; 30 cwt. per acre. *Meadow Hay*—Not much grown; average crop. *Potatoes*—Average about 6 tons per acre; crop well secured under favourable conditions, notwithstanding shortage of labour; no new varieties grown. *Turnips*—Average 20 tons per acre; brairding stiff; some second sowing required. *Insects*—No injury reported. *Weeds*—More in evidence than in former years; somewhat difficult to control owing to prevailing weather during summer. *Pastures*—An average grazing season. *Live Stock*—Throve fairly well; cattle and sheep free from disease; a few isolated cases of grass sickness amongst horses. *Clip of Wool*—Good quality; about an average crop.

ABERDEEN DISTRICT.

ANGUS (Eastern). *Wheat*—Owing to exceptionally hard and unfavourable weather during early spring and summer, at least 2 bushels per acre under average; grain was very badly sprouted and very little is really "millable"; straw very brittle in threshing; seed sown, 3 to 3½ bushels per acre. *Barley*—Not so badly sprouted, and where carefully handled generally of "top" quality; quite up to average yield, 48 to 56 bushels per acre; straw, average length and not too badly lodged; seed sown, 3½ bushels per acre. *Oats*—Splendid crop at time of cutting, in some cases 80 to 90 bushels per acre; badly coloured and sprouted through being in stook for four to six weeks; straw, not of usual feeding quality, but stock ate it fairly well; seed sown, 5 to 6 bushels per acre. *Harvest*—Began about the usual time, 20th August, and lasted well into October; owing to very constant rain and mist, grain was stacked in the fields in small stacks; some good drying winds in October helped greatly, but reconditioning required, and value was reduced. *Hay*—Quite good with plenty clover; 2½ to 3 tons per acre; very well secured. *Meadow Hay*—Practically none grown. *Potatoes*—Good average crop; 10 to 11 tons per acre quite common; disease varied according to districts, but not more than usual; good seed samples hard to get, as Department turned down a very large percentage for leaf-roll and mosaic on the best coast land. *Turnips*—On the best land where a good braird was got, 25 to 30 tons per acre; thin gravelly land caused bad brairding; adverse weather during summer resulted in the worst crop for many years in the poorer districts. *Insects*—No particular damage caused. *Weeds*—No special damage, but lack of labour let them get ahead after July and August rains. *Pastures*—Growth of grass was satisfactory all the season. *Live Stock*—Did very well all the time, as pastures lasted unusually late in the season, saving turnips considerably. Cattle and sheep kept sound and healthy all the time. *Clip of Wool*—Good in quality and very good in weight.

KINCARDINESHIRE. *Wheat*—34 bushels per acre; grain and straw first quality; seed sown, 3 to 4 bushels per acre, drilled. *Barley*—40 bushels per acre; grain and straw below average quality; seed sown, 3 to 4 bushels per acre, drilled. *Oats*—52 bushels per acre; grain and straw slightly damaged by weather; seed sown, 4 to 8 bushels per acre. *Harvest*

—Commenced about the 20th August ; very much drawn out owing to the wet weather ; crop secured in fair condition. *Hay*—35 cwt. per acre ; quality very good. *Meadow Hay*—None grown. *Potatoes*—Very good ; 8 tons 10 cwt. per acre ; very little disease. *Turnips*—13 tons per acre ; very good quality ; very slow to braird due to long spell of dry weather. *Insects*—No injury recorded. *Weeds*—No trouble reported. *Pastures*—Of average growth, but very slow in early summer ; they improved greatly towards the end of the year. *Live Stock*—Very slow in spring, but made average progress in summer ; cattle and sheep generally were free from disease. *Clip of Wool*—Quality good, quantity average.

ABERDEENSHIRE (Central). *Wheat*—32 bushels per acre ; straw, 20 cwt. per acre ; seed sown, $3\frac{1}{2}$ bushels per acre. *Barley*—41 bushels per acre ; straw, 18 cwt. per acre ; seed sown, $3\frac{1}{2}$ bushels per acre. *Oats*—48 bushels per acre ; straw, 20 cwt. per acre ; seed sown, 5 bushels per acre. *Harvest*—Began at usual time, but was protracted in earlier districts due to excessive rain ; later-cut crops were secured in good condition. *Hay*—Permanent grass, 20 cwt. per acre ; ryegrass, 25 cwt. per acre. *Meadow Hay*—None. *Potatoes*— $6\frac{1}{2}$ tons per acre. *Turnips*—12 tons per acre. *Insects*—Not much damage done. *Weeds*—Injury caused by surface weeds, due to excessive wet weather. *Pastures*—Average. *Live Stock*—Throve well ; cattle and sheep generally were free from disease. *Clip of Wool*—Fair ; under average in weight.

BANFFSHIRE (Lower). *Wheat*—None grown. *Barley*—Good crop, very well harvested ; grain, about 30 cwt. per acre ; bushel weight, 52 to 56 lb. ; straw, 20 cwt. per acre ; seed sown, 4 bushels per acre. *Oats*—Average, very well harvested ; about 50 bushels per acre ; straw, fine quality, 25 to 30 cwt. per acre ; seed sown, 6 to 7 bushels per acre. *Harvest*—Began about the usual time ; during the first week weather was at times wet ; with dry weather afterwards and high winds, all secured in splendid condition. *Hay*—30 to 32 cwt. per acre ; earliest cut secured in fine order, but late cut not in very good condition ; crop well mixed. *Meadow Hay*—None grown. *Potatoes*—Much the same as last year, 6 to 8 tons per acre ; lifted in fine condition ; no disease and no new varieties planted. *Turnips*—Not quite up to average, but better than last year ; 14 to 15 tons per acre ; brairded well ; no resowing required. *Insects*—No damage reported. *Weeds*—Not much injury caused, but knot-grass and couch-grass still very prevalent. *Pastures*—Slightly below average in growth ; quality good. *Live Stock*—All did fairly well ; cattle and sheep generally were free from disease. *Clip of Wool*—Fully above average ; quality very good.

BANFFSHIRE (Upper). *Wheat*—None grown. *Barley*—Good crop generally in most districts ; weight hardly up to standard owing to want of sunshine ; average about 32 bushels per acre ; seed sown, 4 to 5 bushels per acre ; quality of straw very good. *Oats*—Good ; some fields extra heavy ; average, 40 to 50 bushels per acre ; bushel weight well up to standard ; quality of straw very good ; seed sown, 5 to 8 bushels per acre. *Harvest*—Started a week or two later than usual ; weather at first not very good, but a few dry weeks allowed the crops to be harvested in splendid order. *Hay*—Good crop generally, but some fields hardly up to usual ; quality good ; average about 2 to 3 tons per acre. *Meadow Hay*—Very little grown. *Potatoes*—Varying results reported ; some fields good, while others produced only a half crop with a large percentage of seed-sized tubers ; average about 4 to 8 tons per acre ; quality good, with

little signs of disease. *Turnips*—Poor generally; returns from 2 tons per acre up to about 10 tons per acre; severe frost in February and March did considerable harm; no difficulty in brairding; and no report of second sowing. *Insects*—Reports that canker in some fields, also "finger-and-toe," had done greater damage than usual. *Weeds*—In oat and barley crops not much damage was done, but turnips were badly affected by the continuous wet weather. *Pastures*—Good average growth on account of spells of wet weather. *Live Stock*—Did well throughout the whole season. There were not so many cases of grass sickness amongst horses as in previous years; no reports of disease amongst cattle or sheep. *Clip of Wool*—Good quality and well up to average in quantity.

INVERNESS DISTRICT.

MORAYSHIRE. *Wheat*—A good crop; 47 bushels per acre; straw, 33 cwt. per acre; seed sown, usually 4 bushels per acre. *Barley*—Threshed exceptionally well; 44 bushels per acre; quality fair; many complaints about skinning in threshing; straw, poor quality, 24 cwt. per acre. *Oats*—An excellent crop; threshed out well; considering the bad harvest, damaged grain was less than expected; straw damaged by weather, especially in earlier districts; yield about 30 cwt. per acre; seed sown, 4 to 6 bushels per acre, according to variety and whether drilled or broadcast. *Harvest*—About the usual time; very protracted owing to weather; ultimately got in good condition. *Hay*—Fair in the hay district; up to 50 cwt. per acre of good quality. *Meadow Hay*—None grown. *Potatoes*—Good average crop; King Edwards light; Majestics and other white crops very good; 7 to 10 tons per acre, according to variety; little complaint of blight. *Turnips*—Very varied; some excellent and some poor; difficult to give a reason for this, but time of sowing had a good deal to do with it; up to 30 tons per acre, but many crops of only 10 to 12 tons per acre; little second sowing. *Weeds*—Not difficult to check. *Pastures*—Were rather bare for a spell, but came away later. *Live Stock*—Cattle did well; cattle and sheep generally were free from disease. *Clip of Wool*—Average, and of average quality.

NAIRNSHIRE. *Wheat*—Little grown; yield about 34 bushels; seed sown, about 3½ bushels per acre. *Barley*—Yield better than last year, about 42 bushels per acre; on some farms yield was reduced through shaking by the wind of over-ripe crop; seed sown, 2 to 3 bushels per acre. *Oats*—Yield about 60 bushels per acre; seed sown, 5 to 6 bushels per acre. *Harvest*—Began at usual time; cutting was very much delayed by wet weather; leading was done in excellent weather, but the whole harvest took about ten days longer than usual. *Hay*—Lighter than last year. *Meadow Hay*—Not grown. *Potatoes*—Bigger yield than last year; about 8 tons, and 11 or 12 tons per acre in the case of some varieties; no disease. *Turnips*—About the same as last year; the crop brairded badly, and resowing was very common owing to damage by fly during the dry weather in May. *Insects*—Caused no injury. *Weeds*—No report of injury. *Pastures*—Of good quality and growth. *Live Stock*—Did well; cattle and sheep generally free from disease. *Clip of Wool*—About average.

INVERNESS-SHIRE (Inverness). *Wheat*—Area same as previous year, about 120 acres, all autumn sown; growth conditions excellent; harvesting difficult; crop above average and in fair condition, say 48 bushels per acre.

acre; seed sown, 4 bushels per acre. *Barley*—Crop above average, 36 bushels per acre; harvesting conditions difficult on early but excellent on later farms; seed sown, 4 bushels per acre. *Oats*—Well above average in quantity, and on later farms of excellent quality; straw plentiful and of good quality; 40 to 60 bushels per acre; straw plentiful and of good quality; seed sown, 6 to 7 bushels per acre. *Harvest*—When early cut was one of the worst on record; on later farms it was in some cases the best experienced, even better than 1945; 90 per cent of crop secured in good condition. *Hay*—30 to 40 cwt. per acre; same as previous year; clover satisfactory; harvesting protracted and difficult; quality fairly good. *Meadow Hay*—Above average; very late in being cut, in some cases not till October. *Potatoes*—Average 6 to 7 tons per acre; compared with 1945 was better on low ground and lighter on higher farms; disease not prevalent. *Turnips*—Average, 22 tons per acre, with many cases of failure; braided very unevenly owing to drought in June, and suffered from wet weather in July and August. *Insects*—No reports of damage. *Weeds*—Not so prevalent as in previous year, except for annuals in turnip crop due to wet July and August. *Pastures*—Of average growth and quality. *Live Stock*—Throve very well; cattle and sheep kept generally free from disease, but it was a bad year for maggots on the west coast. *Clip of Wool*—Quality and quantity, average.

INVERNESS-SHIRE (Skye). *Wheat*—Small quantity sown on one farm in autumn of 1945 was a failure due to effect of excessive rainfall. *Barley*—Virtually none grown. *Oats*—Grain, average 17 cwt. per acre; straw, 19 cwt. per acre; straw cleaner and finer than in previous year; grain also was superior; seed sown, 5 to 6 bushels per acre of the fine-straw varieties. *Harvest*—On average was about a fortnight late in commencing due to wet weather and delayed ripening; it proceeded with unusual rapidity and without a break; crop secured in splendid condition. *Hay*—Early cut deficient in clover and poor in yield; late cut bulked well; early, only about 1½ tons per acre; late, up to 2 tons per acre. *Meadow Hay*—About the same as previous year, but late in coming to cutting stage. *Potatoes*—Yields very variable; quality mainly good; average about 4½ tons per acre; some blight in spite of more extensive spraying, but it did not have same effect as last year; Dunbar Standard was grown for the first time with reasonably good results. *Turnips*—Very variable; on the average a failure, due to wet conditions during July and August and the difficulty of getting the land worked and cleaned; yield difficult to gauge, but probably about 12 to 15 tons per acre; braided was regular, but slow on account of spring drought. *Insects*—Field crops did not show injury to any marked degree. *Weeds*—Turnip and potato crops affected by a general growth which could not readily be dealt with on account of wet conditions from July to September. *Pastures*—Came slowly on account of spring drought; at an early stage became coarse and fibrous with weeds showing strongly; later pasturage improved, the autumn conditions on hill and in field being exceptionally good. *Live Stock*—Both cattle and sheep did excellently, showing splendid condition in late autumn and early winter. Disease was not more evident than usual among either cattle or sheep. *Clip of Wool*—Quality was fully up to average, with ewe wool rather better than hogg wool; quantity showed a marked improvement over the previous year and was well up to average.

INVERNESS-SHIRE (Lochaber). *Wheat*—None grown. *Barley*—None grown. *Oats*—Generally under average; secured in fair condition after standing a long time in stocks, where, however, owing to the nature of

the weather, there was little of the sprouting expected. *Harvest*—Very late owing to weather conditions. *Hay*—Under average; secured late, partly in fair condition; about 2 tons per acre. *Meadow Hay*—Light owing to drought in May and cold wet weather in June and July. *Potatoes*—Under average in quantity and size; free from disease; no new varieties reported on trial. *Turnips*—Light crop owing to continued wet weather; after thinning it was impossible to keep weeds down. *Insects*—No injury noted. *Weeds*—Very plentiful. *Pastures*—Under average. *Live Stock*—Did very well; cattle and sheep generally were free from disease. *Clip of Wool*—About average.

ROSS-SHIRE (Dingwall and Munlochy). *Wheat*—Acreage about average; a good crop spoiled by sprouting in the stook; about 48 bushels per acre; seed sown, about 3 bushels per acre. *Barley*—About the same acreage grown; very good crop, but owing to bad harvest the sample was below average. *Oats*—An excellent crop, but, except in the latest parts, grain and straw were spoiled by the bad harvest conditions. *Harvest*—Except in the higher districts was the worst for many years; bulk of the crop secured in poor condition, but windy weather after harvest improved the stacks. *Hay*—Smaller acreage grown; crop not as good as last year, but generally well got. *Meadow Hay*—None grown. *Potatoes*—Better than last year; harvesting took place under ideal conditions; some fields badly blighted. *Turnips*—On most farms under average, but owing to the good back-end improved considerably; braided badly, and resowing took place on practically all farms; in quite a number of cases a third sowing was required. *Insects*—No damage reported. *Weeds*—Injury appeared to increase. *Pastures*—Grazed well. *Live Stock*—Throve well; cattle and sheep generally were healthy. *Clip of wool*—Average return; quality good.

ROSS-SHIRE (Tain, Cromarty, and Invergordon). *Wheat*—Very variable; in some fields rust badly reduced yields; average, 30 to 40 bushels per acre; straw, average; seed sown, 3 bushels per acre for autumn, 4 bushels per acre for spring. *Barley*—A very poor crop; few farms have received maximum price of £5 per quarter; Goldburg variety did well compared with Abed Maja and Abed Kenia; seed sown: Goldburg 3 bushels per acre, Kenia and Maja 2½ bushels per acre. *Oats*—One of the best crops for many years, with very little lodging; 65 to 70 bushels per acre; seed sown, 4 bushels per acre. *Harvest*—Started at the usual time, but torrential rains held up cutting and leading until third week in September, when stacking proceeded without a stop; grain did not sprout in the stook, although badly discoloured; secured in poor order, though better than expected. *Hay*—A poor light crop; not well secured, as rains came in July. *Meadow Hay*—None grown. *Potatoes*—With the exception of King Edward, which was affected by blight in August, an above average crop; white varieties rather large for seed. *Turnips*—Worst crop for eighty years, due to long drought, cold dry east winds at first, and fly later; second and third sowings common. *Insects*—Fly in turnip fields very bad. *Weeds*—Annuals in turnips due to crop failure. *Pastures*—Very bare in May and June, due to long drought and dry east winds. *Live Stock*—Throve as in an average year. Usual grass sickness in horses; lambs improved from cobalt dosing and the top-dressing of grass fields; "yellows" in sheep more prevalent. *Clip of Wool*—Average.

SUTHERLANDSHIRE. *Wheat*—None sown. *Barley*—32 bushels per acre; straw, about 16 cwt. per acre; grain and straw, fair quality, as

much of the crop was badly laid and weather at harvest very wet. *Oats*—Fairly good taken all over ; about 34 bushels per acre ; straw, 18 cwt. per acre ; quality was only fair ; seed sown, about 4 bushels per acre. *Harvest*—Took a long time to secure ; weather very wet and dull with no drying winds ; crop not in very good condition going into the stack. *Hay*—Not a good crop, suffering from dry cold winds in May and June ; about 17 cwt. per acre on good ground ; much less on poorer land ; quality not very good when secured. *Meadow Hay*—A complete failure in some places owing to the very wet weather, sometimes not worth stacking. *Potatoes*—Not a heavy crop ; about 4 tons per acre ; quite healthy, but got too much rain ; no new varieties planted. *Turnips*—About 10 tons per acre ; suffered from the cold dry winds and from fly in some places ; on a very few farms were a complete failure ; some second sowing owing to the cold frosty winds. *Insects*—Turnips suffered from fly much more than usual. *Weeds*—No damage recorded. *Pastures*—Were not good on arable land ; very dry cold weather in May and June retarded growth, and quality suffered. *Live Stock*—Did fairly well, but were not as good as usual, except for hill sheep, which seemed to thrive well after July. Cattle and sheep generally were very free from disease. *Clip of Wool*—Quality quite good, and about average in quantity.

CAITHNESS-SHIRE. *Wheat*—Not much grown ; where grown, crops good ; 40 bushels per acre ; grain and straw good quality ; seed sown, 4 bushels per acre. *Barley*—An average crop ; rather better quality than previous year ; 32 bushels per acre. *Oats*—Good in all districts ; better quality than last year ; practically no damaged or spoilt crops ; grain, 40 bushels per acre ; straw, 2 tons per acre ; seed sown, 4 to 7 bushels per acre. *Harvest*—Began at usual time ; cutting general by first week of September ; weather was favourable throughout ; best harvest for many years ; crops were rapidly secured in good condition ; very few bad sheaves. *Hay*—An average crop in quantity and quality, both as regards ryegrass and clover ; 3 tons per acre. *Meadow Hay*—Meadows mostly grazed ; not much kept for hay ; crops similar to last year. *Potatoes*—Slightly better than last year ; 5 tons per acre ; some evidence of blight about the middle of August ; no reports of new varieties planted. *Turnips*—Not so good as last year ; slow in braiding ; on some farms resowing was necessary, owing to dryness of soil ; 20 to 22 tons per acre. *Insects*—Evidence of grub in some fields ; damage not greater than usual. *Weeds*—Charlock noticeable in corn crops ; spurrey and sorrel prevalent in turnips ; damage not greater than usual. *Pastures*—Of average growth and quality ; similar to last year. *Live Stock*—Throve well on pastures. Cattle and sheep generally kept free from disease. *Clip of Wool*—Average, and of good quality.

ORKNEY. *Wheat*—None grown. *Barley*—Good quality, and yield considerably above average at 40 bushels per acre. *Oats*—Extra good quality and exceptionally high yield of grain ; average of 45 bushels per acre ; straw, about average at 30 to 40 cwt. per acre. *Harvest*—Exceptionally good weather prevailed for a considerable period before and during harvest ; reaping commenced in earlier districts during the last week of August, and the greater portion of the crop was secured in good order by the end of September. *Hay*—Mainly of good quality ; 30 to 40 cwt. per acre. *Meadow Hay*—Average ; similar to last year. *Potatoes*—Above average and very much higher yield than last year ; 6 tons per acre ; incidence of leaf-roll was reported to be much greater than usual. *Turnips*—As a general rule were poor ; resowing was the rule rather than the

exception and quite a lot of treble sowing was necessary; during the summer many crops suffered severely from "finger-and-toe"; in these circumstances yields varied widely from district to district; average estimated at 4 to 5 tons per acre less than the previous year. *Insects*—No serious damage reported. *Weeds*—Damage not more pronounced than usual. *Pastures*—During the summer were exceptionally good. *Live Stock*—Did very well; cattle, sheep, and horses were remarkably free from disease. *Clip of Wool*—Slightly above average, about 120,000 lb.; quality, of the usual high standard.

SHEPHERD. *Wheat*—None grown. *Barley (Bere)*—Grain, 12 to 14 cwt. per acre; straw, 14 to 16 cwt. per acre; average crop; seed sown, 2 to 3 bushels per acre. *Oats*—Grain, 10 to 12 cwt. and straw 16 to 18 cwt. per acre. In view of wet year astonishingly good yield of grain, while yield of straw above average; rate of seeding, 4 to 7 bushels per acre. *Harvest*—After fairly good start at end of August, weather broke completely in September for about three weeks; during the whole of October it was exceptionally good and crops were secured in fine condition; the best harvest for many years. *Hay*—Seed-hay crop was, like last year, rather below average, especially as regards quality; 14 to 16 cwt. per acre. *Meadow Hay*—Better than last year, but quality poorer; approximately 13 cwt. per acre. *Potatoes*—Definitely lower return than last year; 4½ tons per acre; reduction due to wet season; blight no worse than last year; leaf-roll, hitherto practically unknown, apparent in seed potatoes; no new varieties planted. *Turnips*—Similar to last year—i.e., below average; 12 to 13 tons per acre; braird fairly good; only one sowing necessary. *Insects*—Damage again on the increase and more widespread; cabbage white butterfly caterpillar and turnip root fly larvæ also did injury; "grub" in oats not so troublesome as before. *Weeds*—Crops mainly affected were turnips and swedes, due to wet season; damage by spurrey, chickweed, charlock, &c., not excessive, but dead-nettle troublesome. *Pastures*—Due to wet season, followed by exceptional October, the grazing season was extended by a month. *Live Stock*—Lambs especially were in worse order again, mainly through wet season and lack of sun. Stock free from disease, especially T.B., as proved by current testing scheme to create Shetland an attested area. *Clip of Wool*—Quality good, yield average; white Shetland wool reached highest price yet—namely, 8s. per lb.

THE WEATHER OF SCOTLAND IN 1946.

By W. A. HARWOOD, D.Sc., F.R.S.E.

THIS report consists of (1) a general description of the weather from month to month, and (2) a selection of rainfall returns in which each county of Scotland is represented by one or more stations. Temperature readings, unless otherwise stated, are from thermometers exposed in the regulation "Stevenson screen."

JANUARY.

The year 1946 opened with a typically wintry month. The prevailing cold was broken by two rather milder spells, and once more there was the familiar contrast between rather dry frost in the east and stormy wet weather in the north and west. Showers of snow were widespread. Several inches of snow had accumulated in places at the end of the month, following on widespread snow showers.

The mean temperature of the country as a whole was between 2 and 3 degrees below normal, the deficits being from 3 to 4 degrees in the Fife-Angus area, and from 1 to 2 degrees in the south-west. The first three days were rather cold, and cold conditions recurred on the 12th after a week of variable, but generally milder, weather. The warmest day of the month, the 4th, occurred in this period, giving temperatures of 57 degrees at Prestwick and over 50 degrees at many other places. A second mild spell from the 24th to the 27th was not so pronounced. Between these two mild periods temperature remained mainly below freezing-point even during the day. The coldest days occurred between the 17th and the 21st. At this time Braemar had a minimum temperature of 7 degrees (on 20th-21st) and on both the 17th and 18th Logie Coldstone recorded 10 degrees, while Dalwhinnie, Balmoral, and Buddon Ness were only 1 degree warmer. In fairly severe ground frosts, during the cold period, temperature fell to 3 degrees at Nairn, Dalwhinnie, and West Linton on the 17th and at Braemar on the 21st.

The south-west and centre of the country had rainfall over 50 per cent above normal on exposed coasts, and 25 per cent inland. Tiree reported more than double the normal. The two wet stations Kinlochquoich and Loan respectively registered 17 and 18 inches. In the east and north, on the other hand, rainfall, though it occurred on about half the days of the month, was generally small. Forres

had as little as 0.44 inch and a number of other stations in the Morayshire area less than 1 inch. Snow was reported at one place or another on 26 days, but falls were mainly light. In the period 22nd-24th, however, places in the Balquhiddy area had from 6 inches to a foot.

Sunshine was poor in the Clyde area where the totals of 10 hours at Greenock and Renfrew and 11 at Paisley and Dunoon were some 15 to 20 hours below the normal for January. Fog or low cloud was similarly responsible for deficiencies of about 50 per cent in parts of Perthshire, Perth itself having only 25 hours. The Solway also had a dull month. In the dry area of Moray, on the other hand, totals reached some 30 per cent above the average, Forres, for example, having 73 hours and Gordon Castle and Alness 69 hours. Parts of the east coast from Edinburgh to Aberdeen also recorded appreciably more sunshine than usual.

FEBRUARY.

February had three weeks of rather mild weather followed by a cold spell from the 20th onwards. It was a brighter month than usual in the east and mainly about average elsewhere. Snow blocked roads in parts of the north-east towards the end of the month. Gales occurred on 15 days at the beginning and in the later part of the month. They reached between 90 and 100 m.p.h. in the islands.

Mean temperature was on the whole well above the average for February. The somewhat variable mild spell during the first three weeks brought reports of 57 degrees from Kirkcaldy on the 15th, matched by 56 from a number of stations in the Moray area and along the east coast between the 13th and the 18th. The cold spell was fairly severe from the 25th to the 28th. At this time Dalwhinnie recorded 26 degrees of frost (6° F.) on the 26th, Braemar 25 degrees on the same morning, and Eskdalemuir and West Linton respectively 24 and 23 degrees on the 27th and 28th. Ground frosts occurred at one place or other throughout the month, the lowest readings being 2° F. at Dalwhinnie on the 26th and West Linton on the 28th, closely followed by 3 and 4 degrees respectively at Braemar and Balmoral.

The greater part of the country had about its normal February precipitation, but there was a 30 to 40 per cent excess in the south-west and along the east coast as far north as Aberdeen. There was widespread snow and sleet during the last week which gave accumulations approaching 18 inches in the hills of central Scotland. Drifts of some 5 feet deep blocked main roads in the north-east.

The month was a bright one over the greater part of the country, and especially so in Fife and Angus. The highest sunshine total, 132 hours at St Andrews, was 51 hours above normal. Neighbouring stations had similar amounts. On the other hand, in parts of

the Great Glen, where there is appreciable cut-off by the hills, totals were as low as 50 hours.

MARCH.

This was a notably quiet month with fewer gales than any March for twelve years: there were only 4 stormy days. The first half of the month was cold, but the remainder pleasantly mild. Rainfall was in general rather small; nevertheless sunshine was mainly somewhat below average.

The cold conditions of the last ten days of February persisted until mid-March and temperature remained mainly below 40 degrees. On the 1st, Logie Coldstone reported a minimum of 9 degrees and Dalwhinnie 10 degrees, but there was some improvement from the 4th onwards. Ground frosts, however, occurred at one place or another on most nights of the month. The lowest reading on the ground was 5 degrees at Dalwhinnie on the 1st. The marked improvement on the 17th led to an exceptionally warm spell in which, on the 28th, temperature during the day reached 71 degrees at Kilmarnock and 70 at Dumfries, Ruthwell, and Tongland. This was only the third March with such high temperatures in half a century.

Rainfall varied from 30 to 50 per cent below normal in the north and north-east of the country to somewhat above normal round the Solway. The driest area was Moray where some stations reported less than half their usual rainfall. Most of the month's rain fell during the third week, but there were also widespread snow, sleet, and hail showers in the first fortnight.

Records of sunshine were rather variable. In a few localities of the north, the south-west, and Midlothian the totals were above normal, and elsewhere, although the month generally was rather dull, there were a number of days with over 9 hours' bright sunshine. The highest total for the month—121 hours at Arbroath—was 5 hours below normal, but Turnberry with 119 and Edinburgh with 118 had 4 or 5 hours more than usual. Stations in the Great Glen, Argyll, and the Glasgow area had less than 80 hours.

APRIL.

April had cool dull spells and mild brighter spells, with a rainfall about normal in the north and west, but only about half the normal elsewhere. Wind reached gale force on 9 days.

Temperature was above normal by amounts ranging from 1 degree in the north-west to 5 degrees in the east. The first four days were warm, the highest temperature being 72 degrees, recorded at Aberdeen on the 2nd and at Edinburgh and Marchmont on the 3rd. A cool spell followed until the middle of the month, the coldest night being that of the 10th, on which West Linton and Wolfelee had a temperature of 21 degrees and Braemar, Balmeral,

and Peebles 23 degrees. Ground frosts were widespread during the cold spell, the lowest temperature reported was 15 degrees at Dumfries on the 10th, and there were similarly low temperatures in various localities on that night.

The month was, for the country as a whole, the driest April for eight years. It was very dry in east, south, and central parts of the country, where the month's total rainfall was generally less than an inch—only about one-quarter of the usual amount. North Berwick had 0.11 inch on the 10th but only 0.17 for the whole month, and the month's total of 0.37 at Aberdeen was the lowest recorded there in seventy-five years. The Hebrides also had rather dry conditions. Elsewhere, however, north of the Caledonian Canal rainfall was about normal. Some snow was reported at high-level stations on several days.

Sunshine totals generally agreed with the distribution of rainfall. South and east of the Caledonian Canal many districts had 30 or 40 hours' more sunshine than usual. The highest figures were 199 hours at Arbroath and 191 hours at Stirling. The average daily amount exceeded 6 hours at Stirling, Leuchars, Longforgan, and Troon. Among the lowest totals were 111 hours at Lerwick (16 hours below normal) and 114 at Dalwhinnie.

MAY.

May was a bright and quiet month, with only three occasions of gale locally. Persistent easterly and northerly winds were accompanied by specially warm and dry conditions in the west of the country.

Temperature was on the whole above normal, but there were frosts on several nights in the first fortnight. The warmest days were the 10th, 11th, and the last four days of the month. Kil-marnock reported 76 degrees on the 10th, Ruthwell 74 on the 30th, and other places had readings approaching these. In the early part of the month, on the other hand, the temperature at Dalwhinnie fell to 21 degrees on the night 5th-6th, and damage to fruit trees occurred in Lanark, Perth, and Angus. Ground frosts were frequent until the 25th. Dumfries recorded the lowest surface temperature, namely, 12 degrees on the 16th.

Rainfall was below normal in most parts. Whereas during April some districts of the east had less than an inch of rain, during May the small totals were recorded in the west, Letterewe and Tarbert, for example, having only slightly over one-tenth of an inch. Near and on the east coast itself totals approached the normal, and in parts of Aberdeenshire slightly exceeded the normal; but even in the east most areas had less than three-quarters of their usual amount. The last week of the month, together with a thundery period round the 21st, were responsible for most of the rain which was recorded. Snow and sleet showers occurred, chiefly on high ground, during the third week.

Sunshine was above normal everywhere, especially in the west and south-west, where Tiree and Turnberry had their sunniest May on record. In the south-west several stations reported excesses of 100 hours. The east coast from the Tay to Fraserburgh was less favoured than usual, but even in that area there was a moderate excess. On a number of days several stations experienced over 12 hours' sunshine, and on the 8th Stornoway, Duntuilim, and Tiree had over 14 hours. Tiree totalled 329 hours during the month, 92 hours above normal, and Turnberry followed fairly closely with 311 hours. Along the east coast the totals were rather under 200 hours—that is, some 25 to 30 hours above normal.

JUNE.

In contrast to May, June was a dull wet month over most of the country, and it was correspondingly cool. Wind reached gale force on 6 days in the first and last weeks, the gale on the 5th being severe.

Temperature was well below normal generally, and until the 20th it was only in a few places that the day maxima reached 60 degrees. At Aberdeen the maximum on the 1st, 4th and 14th, which were the coolest days of the month, was only 53. On the coldest nights, from the 9th to the 12th, the minimum was 35 degrees in many inland districts, and on the 12th Dalwhinnie had a temperature of 30 degrees, while both Balmoral and Braemar recorded 32. On the other hand, for 5 days from the 20th weather was warm, especially in the east and centre of the country. During the 22nd the temperature reached 82 degrees at Montrose and Stirling and 80 degrees at a number of stations in Moray, Aberdeen, Angus, and Berwick. Ground frosts occurred on 12 nights in the south-west, Dumfries on the 13th and Glenlee (Kirkeudbright) on the 12th reporting a temperature of 24 degrees.

In June there were only a few parts of the extreme south-west, the south-east, the Lothians, and Banffshire which had less than their normal rainfall. Elsewhere the month's totals were well above the average. The excess was some 30 to 40 per cent in the east and in the Clyde basin, and almost 100 per cent in parts of the north-west. A few places in the West Highlands, Skye, and the Shetlands had more than twice their normal amount. The rainfall was distributed throughout the month with no dry spells.

The month was deficient in sunshine except on the Fifeshire coast and at Banff. The deficiencies were small in parts of the south-east and the south-west, but large in some districts of the Great Glen and round the Solway. In contrast with the 329 hours of May at Tiree, the best total for June was 226 at St Andrews—27 hours above normal. Leuchars, Dunbar, and Banff followed with 218, 214, and 212 hours, while at the bottom of the scale Fort William and Onich, with 94 and 88 hours, had little more than half their usual amounts.

JULY.

July, like June, was dull and wet, though there was a short break of better weather in the second week. There were few gales, but numerous thunderstorms caused some damage in the east and south.

Weather was rather cool on the whole in the north and west, but somewhat warmer than usual in parts of the south and east. At Fort William and Achnashellach, for example, temperature was about 2 degrees below normal, while at Aberdeen and Montrose it was about 2 degrees above normal. The period from the 6th to the 12th was notably warm in the south and east with readings of 82 degrees at Edinburgh on the 12th, 80 degrees at Kelso on the 8th, and similar temperatures elsewhere. There was a shorter warm spell also from the 23rd to the 27th. In contrast with these temperatures were the low readings in the west, where they reached only 63 at Duntuiln, 64 at Achnashellach, and 66 at Onich. No ground frosts were reported.

Hardly anywhere was rainfall short of the average, the only districts reporting any deficiency being a small one in the west and localities on the coast south of the Tay. In the Western Highlands, the Islands, and Moray the month's totals reached about double the normal, and most of the country north of a line from Oban to Peterhead had a 50 per cent excess. In the wet area there were only three or four days without rain, and in the dry one rain fell on about half the days of the month. Rather heavy falls due to thunderstorms were very numerous, being specially widespread on the 4th, on several days of the third week, and again on the 23rd.

At a few stations in Fife, Angus, Midlothian, and the extreme north, sunshine was somewhat above average, but elsewhere July was exceptionally dull. The best figure for the month, 177 hours at Leuchars, was 5 hours in excess of the normal. On the other hand, Turnberry, with 119 hours, had over 50 hours less than usual, while Fort William with 65 and Oban with 82 had little more than half their usual amounts. There were, however, 9 brilliant days, in one part or another, and a number of stations in the east and south-east reported over 13 hours' bright sunshine on the 11th.

AUGUST.

The wet weather of June and July persisted during the coolest August which has occurred for several years. Nevertheless sunshine totals were normal in most places and above normal at a few. There were thunderstorms on about half the days of the month and these caused some damage, through lightning and floods. Winds reached gale force on 4 days only.

For the country as a whole the mean temperature was about 2 degrees below normal. In some parts it was the coolest August

for sixteen years. The month opened mild, but after the first week there were only short intervals of summery weather. During the opening *seasonable spell* maxima of 70 degrees occurred widely, and on the 5th, which was the warmest day of the month, Strathy, Banff, and Marchmont reported 74 degrees, while Cupar and North Berwick had 73 degrees. The third week was specially cool. Day temperatures at this time were below 60 in many parts on the 18th and 19th, and Dalwhinnie reported only 50 degrees on the 14th. There was a recurrence of frost at night, after the frost-free July, Dalwhinnie having a temperature of 31 degrees on the 27th, and Peebles 32 degrees on the 26th and 27th. Slight ground frosts recurred also at Edinburgh, Peebles, and West Linton on the 16th and at high-level stations on a number of nights after the 21st.

Persistent unsettled weather and widespread thunderstorms gave moderate to large excesses of rainfall in the eastern half of the country, especially in Moray, on Deeside, and in parts of Angus and the Borders. The west, on the other hand, except parts of Argyll, Inverness, and the Solway area, was drier than usual. In the wet areas at Achnashellach, Strathy, and Eskdalemuir there were 27 days with measurable rain, and at Dundee heavy falls on the 30th caused damage through floods.

The mean duration of bright sunshine for the country as a whole was about normal. There were, however, some local pronounced excesses and a moderate excess generally in the north, the Clyde Basin, and Ayrshire. In the east and south, on the other hand, some districts had exceptionally dull weather. Tiree with 197 hours and Stornoway with 179 reported between 40 and 50 hours more than usual, and they were followed by Greenock with 172 and Helensburgh with 167. On the other hand, Fort William had only 103 hours, Peebles 105, and Eskdalemuir 102, the last figure being the fourth lowest at Eskdalemuir in twenty years.

SEPTEMBER.

The very severe gale which caused so much damage in England and Wales on the 20th did not affect Scotland, but gales were frequent and severe after the 12th. Weather was generally unsettled like that of the preceding three months, with persistent wet, dull, and rather mild conditions. Thunderstorms were widespread on the 1st and 2nd.

Mean temperature was above normal except from the 18th to the 23rd, and decidedly above normal during the last week. Mild nights contributed a good deal towards this result. The excess for the country as a whole was between 1 and 2 degrees. On the warmest day, namely the 28th, five widely separated stations—Wolfelee, Glasgow, Achnashellach, Kilmarnock, and Auchincruive—reported maxima of 72 degrees, and other places had similar readings. The coolest day, the 18th, gave readings of 48 degrees at Kelso and 50 at a number of scattered stations. The month was very exceptional in that no frost was reported, only September

1945 in the past ninety years having been similarly free from frost. The lowest night temperatures were 33 degrees at Logie Coldstone on the 18th and 34 at Dalwhinnie and Balmoral on the 20th. Some ground frosts occurred, however, and gave readings of 28 degrees at Longforgan on the 19th and at Craibstone (Aberdeenshire) on the 20th.

The month was the third wettest September for the last seventy years over the country as a whole. Rainfall was everywhere above normal, and at all except a few places decidedly so. In parts of Fife, Perth, Stirling, Dumbarton, Argyll, Renfrew, Lanark, Dumfries, and round the Solway it was more than twice the normal. In many western districts there were only three or four days without rain and on several days falls were heavy. There was flooding locally.

In some areas of the south the month was the dullest for over thirty years, but north of a line from Aberdeen to Tiree sunshine was a few hours in excess of the normal. Border districts had as much as 50 hours less than usual, and the region between the Clyde and Forth a deficiency of some 30 to 40 hours. The highest totals were 133 at Craibstone, 131 at Dyce (Aberdeen), and 129 at Wick, and the lowest, 51 at Benmore, 55 at Eskdalemuir, and 59 at Glasgow.

OCTOBER.

After four successive wet months, October (normally a very rainy month) was extremely dry: it was the driest October on record and the driest month since April 1938. Weather was in general rather cold and, in the east, dull. Conditions were exceptionally quiet for October as there were only five gales, none of which was severe.

Temperature was variable. There were mild days from the 1st to the 5th and again for a few days after the 19th, but the rest of the month was decidedly cool. For most of the country the mean temperature was appreciably below normal. There were, however, slight local excesses in the east and south-west. The highest day temperatures were 67 degrees at Prestwick and Gordon Castle on the 1st and 3rd respectively, and the lowest night temperatures, 20 degrees at Braemar and Dalwhinnie on the 11th and 27th. In the coldest spell, during the last week, the highest day temperature was less than 45 degrees at various places in the south. Ground frosts were frequent and widespread after the 5th. Dalwhinnie had ground temperatures of 11 degrees on the 11th and 27th, Braemar 17 on the 11th, and Peebles the same reading on the 29th.

Rainfall was much below normal in all parts of the country. Over a broad belt between Nairn, Aberdeen, Tiree, and Dunoon the month's total was almost everywhere less than one-tenth of the normal, and to north and south of this belt only about one-fifth of the normal. During the dry spell following the first few days of the month many places in the east, and some in the west also,

had 15 days or more without rain. Kylesku and Badaguish reported only one day with rain, the amounts being 0.09 and 0.04 inch respectively. Few totals exceeded 1 inch.

There was a rather marked contrast in sunshine between the east and west of the country, the east having a dull month, while in the west, north-west, and Moray weather was bright. The Glasgow area and the Solway also reported rather low totals. During the second week Duntuilin (Skye) had a remarkable sequence of sunny days from the 6th to the 13th with an average of over 9 hours per day. The highest total was 123 hours at Forres, followed by 115 at Duntuilin. On the other hand, Renfrew had only 54 and Marchmont 55, while Aberdeen, with 57, was 37 hours below its normal and below its total for any October of the past sixty-five years.

NOVEMBER.

In November the wet weather was resumed, after the October break in the sequence of wet months. Conditions were dull but exceptionally mild. Wind reached gale force on 10 days, the gales being severe and causing damage during the period 17th-21st.

Mean temperature was above normal in all parts of the country, and especially so in the south and south-east where the excess reached 3 degrees. The first week was abnormally warm, many places reporting readings of 65 degrees. The highest temperature of the month, namely 69, occurred at Edinburgh on the 4th. This is the highest November temperature recorded in Scotland during the last ninety years. Leuchars, St Andrews, and Nairn equalled the previous highest (68 at Laing in 1906) also on the 4th, and other stations reported 67. In addition, nights were exceptionally mild during this period, Edinburgh and Kilmarnock having minima as high as 57 degrees on the 4th-5th. On the other hand, there was a wintry spell in the second week, during which the day temperature on the 8th in Edinburgh reached only 45 degrees, and another cold spell in the middle of the month when (on the 14th) the day maximum at Braemar was only 32 degrees and (on the 15th) at Balmoral only 34. There were night frosts in many districts on the 15th, and in parts of the south on the 23rd, the lowest readings being 16 degrees at Balmoral and Braemar on the 15th. Ground frosts were general on 24 nights. They were most severe on the 15th when Braemar had a reading of 12 degrees and Balmoral 13.

Rainfall was much above normal except in the Western Highlands where it was rather below normal. Large areas in Aberdeen, Kincardine, Angus, and Fife had more than double their usual amounts. Light falls during the first week were followed by a few dry days, but after the 14th the rain was frequent and general. The wetter areas had only 3 or 4 days without rain. There were floods along the Don and the Dee. Snow, sleet, and hail showers occurred from the 12th onwards.

- Sunshine totals were some 20 to 30 hours below normal in the

east and south-east, but a few stations in the west (among them Fort William and Onich) had between 5 and 15 hours more than usual. The highest totals were 61 hours at Tiree and 59 at Longforgan, and the lowest, 20 at Eskdalemuir, which had its lowest November total in 35 years. Other small totals were 21 at Peebles and 22 at Ruthwell.

DECEMBER.

The most noteworthy feature of December was its low temperature. The month was rather dry in the north of Scotland, but had its normal rainfall in other parts of the country. Sunshine totals were mainly about average. Ice-bound roads interrupted traffic during the second week, and high-level roads in central Scotland were blocked by snow. There were gales in one place or another on 14 days. They were severe on the 1st, 2nd, 11th, and 25th.

The month was the sixth coldest December for thirty-five years. Mean temperature for the whole country was about 2 degrees below normal, and only the Shetlands reported a slight excess over the normal. In the first fortnight conditions were mainly unsettled, but with some fine days and clear, cold nights. This was followed by a cold spell lasting until the 21st, after which temperature rose to its highest values for the month. During the cold spell the day maximum on the 18th reached only 25 degrees at Dalwhinnie and 30 at Renfrew and Fort William. On the morning of that day Dalwhinnie had a temperature of 18 degrees and on the following morning Glenlee reported the same reading. The highest temperature of the month was 54 at Arbroath on the 25th, similar temperatures being recorded at a number of other stations. Ground frosts occurred on every night at one place or another. Braemar had a reading of 10 degrees on the 14th and Edinburgh 11 degrees on the 19th.

Rainfall was below normal in all northern areas except the Shetlands, below normal in Moray where totals were less than half the normal, about normal in most parts of the south, and in moderate excess over parts of Angus, Fife, Argyll, and the extreme south-west. Nairn and Fortrose had less than 1 inch of rain during the whole month. Snow, sleet, and hail showers were widespread in the first fortnight and the last week. At this time the Ballater-Tomintoul road was blocked, and numerous other roads ice-bound.

Sunshine, on the whole, was about normal, varying from appreciably above normal in the east and south-west to appreciably below normal at a few places in the west. Edinburgh headed the list with 54 hours (12 above normal), followed by Turnberry with 53 (22 above normal). At the other end of the scale Fort William had 8 hours, Cardross and Lerwick 14, and the Glasgow area from 16 to about 25 hours. Except in the case of Cardross, which had 14 hours less than usual, these small totals did not differ much from the long-period averages.

RAINFALL (MEASURED IN INCHES) FOR 1946

AT SELECTED STATIONS IN SCOTLAND.

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Shetland—Lerwick	4.78	8.70	3.27	8.54	1.03	4.27	3.56	4.46	4.05	1.15	5.82	5.91	45.49
Caitness—Wick	1.84	3.26	1.61	1.24	1.40	2.73	3.46	1.98	2.15	.88	4.21	1.90	25.06
Sutherland—Melvich	1.81	4.31	1.95	2.15	1.38	3.29	4.04	3.44	3.76	.88	3.58	2.15	32.94
Lairg	2.07	5.72	1.83	2.10	1.24	3.24	5.71	4.23	4.96	.72	6.28	3.66	42.86
Ross and Cromarty—													
Portree	1.27	2.88	1.06	.68	1.66	2.64	5.42	2.23	2.85	.42	3.07	.91	24.59
Lochcarron	7.54	7.50	2.44	6.07	1.86	5.78	9.34	5.56	5.93	1.21	6.14	6.78	65.60
Stornoway	4.34	4.20	2.26	2.47	1.01	3.81	4.50	3.17	6.28	.76	5.41	4.19	42.40
Inverness—													
Inverness	1.57	2.08	.94	.92	1.69	2.92	5.17	3.70	3.84	.43	2.90	1.07	27.23
Fort William	12.44	7.12	4.47	3.77	1.42	6.72	8.18	6.44	9.53	.74	5.78	7.90	74.51
Glenquich	15.40	11.13	5.25	6.64	.93	9.48	12.81	4.67	13.22	1.24	10.81	10.57	101.65
Portree	8.51	5.83	3.84	4.91	1.80	6.75	8.01	4.94	9.44	1.32	8.84	8.23	71.92
Nairn—Nairn	.78	1.44	.75	.74	1.54	2.22	4.84	2.92	3.28	.16	2.56	.72	21.95
Meray—Gordon Castle	.66	2.26	1.24	1.60	1.84	2.11	4.97	4.99	3.62	.30	3.70	1.72	28.91
Kellas House	.75	3.40	1.26	1.99	2.04	2.61	7.47	4.11	5.94	.62	4.43	2.35	36.87
Banff—Banff	1.17	2.16	1.60	1.08	1.67	1.29	4.70	3.17	2.42	.18	4.08	2.04	25.56
Aberdeen—Peterhead	1.33	2.39	1.03	.80	1.96	2.00	4.31	2.01	2.53	.58	5.25	2.60	26.74
Aberdeen (King's Coll.)	1.11	1.42	1.44	.87	2.74	2.53	4.10	3.00	3.70	.50	5.98	2.86	29.75
Balmoral	2.74	1.99	1.31	.82	2.20	2.49	4.55	5.14	4.67	.27	5.79	2.88	34.55
Kincardine—Fordoun	1.74	1.39	2.03	.31	1.96	3.66	5.91	8.76	5.20	.54	4.87	5.00	39.97
Angus—													
Montrose (Asylum)	1.33	.96	1.65	.24	1.33	3.34	4.05	2.67	3.25	.49	6.46	3.63	29.40
Dundee	1.90	1.23	2.27	.36	1.71	2.90	3.45	5.94	3.52	.45	6.52	2.97	33.22
Glamis Castle	2.68	1.27	1.99	.25	2.25	3.56	4.32	5.04	4.53	.54	7.16	4.14	37.73
Brechin	1.97	1.04	1.90	.22	1.74	4.06	5.60	3.64	4.26	.42	7.52	4.65	37.02
Perth—Blair Castle	4.17	3.34	1.08	.51	1.84	2.45	3.67	3.35	4.10	.30	5.04	3.67	33.82
Crieff	4.97	2.01	2.28	.50	1.72	4.03	3.68	4.29	6.74	.97	6.46	5.09	42.74
Perth	2.95	1.50	2.17	.39	1.41	2.81	3.08	3.56	4.28	.31	5.26	3.17	30.89
Fife—Cupar	1.96	.86	2.47	.37	1.94	3.31	4.98	3.92	3.24	.38	6.19	2.83	32.45
Kirkcaldy	2.14	1.50	2.18	.65	2.33	3.11	2.86	3.94	4.24	.45	4.82	2.98	29.70
Kinross—Loch Leven	3.74	1.74	2.81	.69	1.78	3.01	4.06	4.07	5.17	.29	6.40	3.71	37.47
Clackmannan—													
Tillieclochy	3.98	2.51	2.57	.71	1.79	2.19	4.42	4.02	6.00	.60	5.92	3.85	38.04
Argyll—Gruline (Mull)	13.53	6.68	4.95	4.70	.88	7.19	7.23	6.73	9.05	.88	7.64	10.16	80.42
Oban	6.49	4.23	2.94	2.99	1.68	3.17	4.67	6.40	5.91	.40	4.42	6.49	49.79
Glencoe Gardens	16.72	6.78	6.73	5.42	1.63	6.85	8.60	8.09	11.64	.66	10.10	11.16	94.86
Inveraray	12.54	6.66	4.87	2.84	1.70	7.20	5.74	7.05	10.26	.66	7.54	9.78	76.84
Bute—Rothsay	7.43	4.39	2.78	2.73	.98	3.80	3.91	4.03	7.77	.61	6.71	6.26	51.40
Stirling—Stirling	4.61	2.80	1.99	.61	1.52	2.77	3.50	3.09	5.91	.71	6.04	3.56	37.11
Dumbarton—													
Garelochhead	12.30	7.02	4.45	2.73	2.48	5.52	4.61	5.83	11.67	.29	12.34	11.81	80.55
Helensburgh	7.45	4.25	3.37	2.19	2.18	4.18	4.05	4.01	6.89	.60	6.95	6.36	52.48
Renfrew—Greenock	10.07	4.07	2.93	2.38	1.46	3.90	3.86	2.52	7.49	.58	6.59	7.93	53.78
Paisley	6.66	3.26	2.67	1.48	1.66	2.66	3.51	2.68	7.16	.70	6.21	4.55	43.10
Ayr—Kilmarnock	4.53	2.70	2.73	2.21	1.81	2.78	3.59	2.90	7.27	.49	5.49	3.81	39.48
Frestwick	3.90	2.19	1.45	1.22	1.05	1.83	2.96	1.69	5.07	.48	5.21	3.14	30.19
Muirkirk	4.98	3.46	2.10	2.01	.71	3.58	3.87	3.08	7.72	.61	6.73	3.57	42.42
Colmonell	7.84	2.82	1.54	1.07	.49	1.73	3.80	2.82	5.68	.48	6.51	5.48	39.76
Lanark—													
Glasgow (Botanic Gdns.)	4.61	2.42	2.02	1.30	1.28	3.03	3.56	2.20	5.58	.51	5.07	3.30	34.88
Douglas (Newmains)	4.58	2.60	1.88	1.33	.99	2.79	3.71	2.99	5.78	1.03	4.96	3.55	36.19
Biggar	8.06	1.94	2.14	1.15	1.17	1.98	3.41	3.51	5.92	.62	4.09	2.58	31.57
Linlithgow—													
Houston House	3.31	2.54	2.27	.61	2.34	2.37	3.59	4.13	4.71	.74	4.48	2.69	33.78
Midlothian—													
Edinburgh	1.81	1.58	1.54	.40	1.89	1.65	3.05	3.59	3.02	.86	3.29	1.87	24.55
Oxenford Castle	1.77	1.02	2.07	.45	1.80	1.45	3.01	3.89	3.30	.80	3.97	2.11	25.64
Haddington—													
North Berwick	1.43	1.08	2.43	.17	2.22	2.47	3.18	2.98	2.66	.68	4.03	1.86	25.21
West Hopes	2.29	1.42	3.30	.50	1.60	2.12	3.70	5.96	4.12	.48	6.15	3.68	35.32
Berwick—Duns Castle	1.76	.93	2.23	.42	1.53	2.08	2.39	3.55	2.01	.74	5.67	2.11	28.27
Marchmont	1.93	.84	2.21	.43	1.41	1.44	2.54	3.97	3.83	.85	5.88	1.92	26.75
Peebles—West Linton	3.03	2.85	2.37	.95	1.31	2.54	4.13	3.67	4.78	.65	4.28	3.35	33.91
Selkirk—Caddonfoot													
(Fairlie Gardens)	3.37	1.50	2.42	.45	1.65	2.79	2.51	3.46	4.07	.68	5.32	2.26	30.48
Roxburgh—													
Kello	1.53	.83	1.26	.49	1.59	1.56	2.61	4.64	2.56	.80	4.37	1.60	23.84
Wolfelee	3.63	1.57	2.42	.64	1.50	2.41	3.49	6.00	3.93	.55	6.27	3.45	35.86
Dumfries—Dumfries	4.73	1.94	3.06	.90	1.18	3.39	3.07	4.54	6.66	.80	7.38	4.86	43.41
Langholm	6.48	2.78	4.19	1.33	1.78	5.60	5.32	5.70	8.35	.91	9.73	5.84	58.01
Eskdalemuir	7.62	3.93	5.26	1.97	1.35	6.38	4.58	6.25	9.48	.90	10.81	6.53	65.06
Kirkcudbright—Castle													
Douglas (Corbieleton)	6.15	2.62	4.42	1.19	1.30	3.93	3.77	3.53	7.64	.80	8.21	5.03	48.59
Carnphairn (Cornharrow)	7.77	4.07	3.81	1.45	1.03	2.73	4.66	4.44	10.06	1.22	9.99	6.40	57.63
Auchincarrn	6.61	3.49	3.68	1.48	1.05	4.33	3.99	4.36	6.80	.79	8.58	5.16	50.32
Wigtown—Monreith	6.08	2.44	2.98	1.01	1.34	2.32	2.34	4.08	5.95	.67	7.19	4.83	41.73

AGRICULTURAL STATISTICS.

TABLES 1 TO 8.

THE detailed information regarding the acreages under crops and grass, yields per acre, total produce and numbers of live stock for each county of Scotland, which formerly appeared in Tables 1 to 8, is not yet available for the years 1939-46.

[TABLE No. 9.

TABLE No. 9.—QUANTITY AND VALUE OF CORN, &C., IMPORTED INTO THE UNITED KINGDOM
IN THE UNDERMENTIONED YEARS.

[From Trade and Navigation Returns.]

	Quantities.			Values.		
	1938.	1945.	1946.	1938.	1945.	1946.
Grain (other than grain for sowing)—						
Wheat	Cwt. 101,626,356	Cwt. 71,034,958	Cwt. 67,791,638	£ 38,627,554	£ 57,095,692	£ 66,751,457
Barley	19,875,622	2,036,552	2,195,223	6,849,732	1,326,466	1,759,293
Oats	1,575,721	2,087,875	2,098,675	537,520	1,826,477	2,015,592
Maize	57,581,046	10,207,415	2,402,795	17,699,832	4,974,174	2,314,610
Rice, husked or cleaned	2,671,216	503,570	152,872	1,182,557	799,357	207,128
Peas, not fresh	1,945,811	672,859	586,157	1,140,915	827,217	1,240,156
Beans, not fresh	955,591	648,474	718,410	501,220	1,023,229	1,676,001
Lentils	280,673	25	6,009	125,269	47	14,309
Other kinds of grain	140,962	20,273	41,667	45,849	15,466	53,050
Products of the milling and allied industries—						
Wheat products—						
Meal and flour	7,676,749	10,856,943	10,745,765	3,979,988	11,784,062	13,634,929
All other descriptions	331,820	37,908	1,355	533,189	49,716	3,207
Oat products	596,753	763,072	69,509	772,592	1,031,837	140,835
Maize products	3,850,011	762,509	623,649	1,627,350	880,281	1,016,830
Flour and meal of other cereals	76,707	14,576	12,021	33,292	22,963	18,037
Farinaceous substances, for use as food, not elsewhere specified	698,859	12,722	27,083	394,090	35,919	52,171
Other articles, under grain and flour for food	270,753	2,036	14,274	367,389	3,691	33,624
Total of Group	200,154,650	99,661,767	87,487,102	74,418,338	81,396,594	90,931,229

TABLE NO. 10.—SUMMARY OF TOTAL VALUES APPEARING IN TABLE NO. 9
OF GRAIN AND FLOUR IMPORTED INTO THE UNITED KINGDOM IN THE
UNDERMENTIONED YEARS.

	1938.	1945.	1946.
From—	£	£	£
Union of South Africa	1,540,071	100	..
Southern Rhodesia	208,936	..	..
Kenya	194,805	..	..
British India	1,909,975	9,169	2,190
Burma	684,915	..	..
British Malaya	195,024	..	14,284
Australia	14,392,095	171,655	101,346
Canada	18,592,293	64,226,071	67,859,888
Other British countries	234,108	83,018	473,392
Soviet Union	4,187,343	..	..
Dutch East Indies	148,508	..	..
Madagascar	114,420	53,911	115,608
Iraq	991,342	..	13
United States of America	15,602,821	6,095,356	14,243,759
Chile	183,558	105,874	456,125
Brazil	150,558	665,608	909,986
Argentine Republic	8,190,189	9,985,767	6,489,693
Other foreign countries	6,897,377	65	264,945
	74,418,338	81,396,594	90,931,229

TABLE NO. 11.—SUMMARY OF TOTAL VALUES APPEARING IN TABLE NO. 14
OF DAIRY PRODUCE IMPORTED INTO THE UNITED KINGDOM IN THE
UNDERMENTIONED YEARS.

	1938.	1945.	1946.
From—	£	£	£
Eire	3,326,631	3,432,334	3,398,350
Union of South Africa	376,575	40,409	71,852
Australia	11,114,163	7,903,495	16,004,632
New Zealand	20,378,696	28,350,016	25,639,023
Canada	3,008,040	16,911,980	12,533,121
Other British countries	244,909	9,704	31,398
Finland	1,303,549	..	..
Estonia	951,001	..	..
Latvia	1,637,201	..	..
Lithuania	1,259,027	..	..
Sweden	1,737,371	1	194
Denmark	18,059,459	5,568,357	10,634,619
Poland	1,848,545	4	15,003
Netherlands	8,521,114	..	44
China	2,977,406	..	..
United States of America	153,852	17,846,312	43,665,547
Argentine Republic	721,704	1,840,530	2,088,036
Other foreign countries	2,394,733	2,025	1,026,427
	80,013,976	81,905,167	115,108,246

TABLE No. 12.—QUANTITIES AND VALUES OF MEAT OF ALL KINDS IMPORTED INTO THE UNITED KINGDOM IN THE UNDERMENTIONED YEARS.

	Quantities.			Values.		
	1938.	1945.	1946.	1938.	1945.	1946.
BEEF :—						
Fresh and salted				£	£	£
Chilled	5,461	77,760	50,402	7,504	354,288	238,461
Frozen—	8,963,501	..	84	17,676,352	..	354
Fore and hind-quarters	1,630,443	2,135,504	4,241,143	2,632,342	9,938,542	17,942,594
Boned and boneless	911,947	1,576,406	3,619,128	1,609,177	7,819,464	16,242,760
Tongues and other descriptions	754,768	361,259	384,778	1,775,775	1,207,090	1,410,266
Tinned, canned, &c.—						
Tongues	83,327	74,593	65,897	733,145	1,031,058	941,964
Other descriptions	1,000,321	1,522,151	3,096,567	2,655,972	9,305,236	19,197,169
VEAL, including fresh, chilled, frozen, tinned, canned	433,283	298,858	335,803	1,108,010	1,010,817	1,788,882
MUTTON and Lamb :—						
Fresh	24,047	2,771	48	86,661	14,627	204
Chilled or frozen—						
Mutton	1,604,916	2,160,944	2,606,032	2,810,483	6,417,960	7,090,537
Lamb	5,283,921	5,139,598	5,629,752	16,396,012	23,225,580	25,154,464
Other descriptions	225,851	254,714	266,044	662,956	1,019,086	1,092,203
Tinned, canned, &c.	118,490	230,143	237,180	333,496	1,256,842	1,402,100
PIG PRODUCTS :—						
Bacon	6,867,915	4,569,036	3,465,866	30,920,940	27,342,592	22,732,624
Hams	694,321	300,557	72,519	3,015,391	1,623,504	475,995
PORK—						
Fresh	36,844	..	5	129,431	..	24
Chilled or frozen	1,180,866	3,850,706	1,598,175	3,680,644	16,180,659	8,781,399
Salted, pickled, &c.	10,861	1,970	712	35,882	8,837	3,987
Other descriptions	185,176	180,348	143,724	418,001	652,131	434,193
Tinned, canned, &c., of all descriptions	170,546	119,476	251,756	1,218,902	890,402	2,500,890
RABBITS, fresh and frozen	253,122	187,625	237,809	452,017	567,293	846,076
POULTRY (dead), all kinds	445,103	190,575	319,791	1,741,692	2,172,569	4,095,680
GAME (dead), fresh, chilled, or frozen	25,356	2,926	4,481	117,373	33,511	44,983
EXTRACTS and essences	66,412	100,255	130,875	374,094	1,527,682	3,406,941
SAUSAGES of all kinds, other than tinned, canned, &c.	2,921	473	3,394	19,793	2,042	37,268
POULTRY and meat pastes, &c.; sausages, tinned, canned; meat pies	10,337	5,773	330,783	57,894	39,267	2,949,663
ALL other kinds	3,176	13,406	54,691	11,920	30,308	432,574
	30,963,142	23,337,827	27,147,262	90,679,859	113,671,387	139,244,465

TABLE NO. 13.—SUMMARY OF TOTAL VALUES IN TABLE 12 OF MEAT IMPORTED INTO THE UNITED KINGDOM IN THE UNDERMENTIONED YEARS.

	1938.	1945.	1946.
From—	£	£	£
Eire	3,074,061	4,833,845	4,712,642
Australia	11,000,425	7,475,565	12,874,935
New Zealand	14,680,534	23,655,968	28,354,104
Canada	6,964,856	35,557,040	24,940,896
Other British countries	294,288	230,968	147,936
Sweden	1,159,729	3	946
Iceland	93,864	60,202	175,157
Denmark	16,260,955	1,950,176	6,431,336
Poland	2,461,295	..	16,720
Netherlands	2,519,114	..	55
United States of America	3,361,335	12,570,009	13,143,282
Chile	473,520	404,792	..
Brazil	1,585,678	2,342,649	4,224,923
Uruguay	2,525,163	3,150,789	6,401,151
Argentine Republic	21,262,180	20,840,794	36,047,246
Paraguay	123,661	597,488	1,680,698
Other foreign countries	2,839,201	1,099	92,438
	90,679,859	113,671,387	139,244,465

TABLE No. 14.—QUANTITIES AND VALUES OF BUTTER, MARGARINE, CHEESE, MILK PRODUCTS, AND EGGS IMPORTED INTO THE UNITED KINGDOM IN THE UNDERMENTIONED YEARS.

	Quantities.			Values.		
	1938.	1945.	1946.	1938.	1945.	1946.
BUTTER	Cwt.	Cwt.	Cwt.	£	£	£
CHEESE	9,517,913	3,802,403	4,229,762	50,873,133	31,705,834	37,374,830
Eggs in shell :—	2,927,326	3,824,872	4,080,655	9,681,245	19,439,734	26,141,869
Poultry	Th. doz.	Th. doz.	Th. doz.			
Eggs, not in shell :—	276,977	69,072	81,318	12,374,548	8,075,280	9,283,507
Liquid or frozen, &c.	Cwt.	Cwt.	Cwt.			
Dried whole	937,154	..	320,920	3,038,298	..	2,597,676
Dried yolk	6,357	701,563	839,158	70,950	16,830,962	29,339,683
Dried albumen	3,510	..	..	32,408	..	7
	19,539	1,143	..	242,491	22,585	10
	Lb.	Lb.	Lb.			
LACTOSE (sugar of milk)	1,233,384	784,000	108,108	28,263	36,284	10
	Cwt.	Cwt.	Cwt.			
MARGARINE	108,894	140	293	150,214	532	1,095
Milk and cream :—						
Cream	52,987	..	1	251,891	..	7
Condensed milk, unsweetened	316,306	1,203,549	1,725,435	619,755	2,917,846	6,041,453
Condensed milk, sweetened—						
Whole	100,128	77,234	83,408	191,099	340,448	364,757
Separated or skimmed	1,217,718	27,050	16,077	1,638,715	76,637	45,388
Milk powder, unsweetened—						
Whole-milk powder	91,798	163,371	114,774	317,404	940,512	796,947
Skimmed milk powder	263,602	434,830	623,720	393,293	1,494,134	3,084,202
Buttermilk and whey powder	*	1,000	5,200	*	1,400	7,757
ALL other articles*	107,712	14,780	17,562	110,569	22,989	29,248
	..	..	..	80,013,976	81,905,167	115,108,246

* Imports, if any, included under "all other articles."

EDINBURGH CORN MARKET.

STATEMENT SHOWING THE PRICES OF WHEAT, BARLEY, AND OATS
FOR THE YEAR 1946.

The Corn Sales Act of 1921 provides that all sales are to be effected by weight only, and expressed in terms of or by reference to the hundredweight of 112 lb. Experience has proved it to be convenient to quote at a price per 4½ cwt. for Wheat, 4 cwt. for Barley, and 3 cwt. for Oats.

The following statement gives a record of the year's proceedings in Edinburgh Corn Market.

1946.		WHEAT, per 4½ cwt.		BARLEY, per 4 cwt.		OATS, per 3 cwt.	
		Highest.	Lowest.	Highest.	Lowest.	Highest.	Lowest.
		s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
January	2	63 9	..	100 0	90 0	46 3	43 6
"	9	63 9	..	100 0	90 0	46 3	43 6
"	16	63 9	..	100 0	90 0	46 3	43 6
"	23	63 9	..	100 0	90 0	46 3	43 6
"	30	63 9	..	100 0	90 0	46 3	43 6
February	6	65 3	..	100 0	90 0	47 3	44 6
"	13	65 3	..	100 0	90 0	47 3	44 6
"	20	65 3	..	100 0	90 0	47 3	44 6
"	27	65 3	..	100 0	90 0	47 3	44 6
March	6	66 9	..	100 0	90 0	47 3	44 6
"	13	66 9	..	100 0	90 0	47 3	44 6
"	20	66 9	..	100 0	90 0	47 3	44 6
"	27	66 9	..	100 0	90 0	47 3	44 6
April	3	68 3	..	100 0	90 0	48 9	46 0
"	10	68 3	..	100 0	90 0	48 9	46 0
"	17	68 3	..	100 0	90 0	48 9	46 0
"	24	68 3	..	100 0	90 0	48 9	46 0
May	1	68 3	..	100 0	90 0	48 9	46 0
"	8	68 3	..	100 0	90 0	48 9	46 0
"	15	68 3	..	100 0	90 0	48 9	46 0
"	22	68 3	..	100 0	90 0	48 9	46 0
"	29	68 3	..	100 0	90 0	48 9	46 0
June	5	69 0	..	100 0	90 0	48 9	46 0
"	12	69 0	..	100 0	90 0	48 9	46 0
"	19	69 0	..	100 0	90 0	48 9	46 0
"	26	69 0	..	100 0	90 0	48 9	46 0
July	3	69 0	..	100 0	90 0	48 9	46 0
"	10	No grain offered					
"	17						
"	24						
"	31						
August	7						
"	14	65 3	..	101 0	81 0	48 9	43 6
"	21	65 3	..	101 0	81 0	48 9	43 6
"	28	65 3	..	101 0	81 0	48 9	43 6
September	4	65 3	..	101 0	81 0	45 9	43 6
"	11	65 3	..	101 0	81 0	45 9	43 6
"	18	65 3	..	101 0	81 0	45 9	43 6
"	25	65 3	..	101 0	81 0	45 9	43 6
October	2	62 3	..	101 0	81 0	45 9	43 6
"	9	62 3	..	101 0	81 0	45 9	43 6
"	16	62 3	..	101 0	81 0	45 9	43 6
"	23	62 3	..	101 0	81 0	45 9	43 6
"	30	62 3	..	101 0	81 0	45 9	43 6
November	6	63 4½	..	101 0	81 0	46 3	43 6
"	13	63 4½	..	101 0	81 0	46 3	43 6
"	20	63 4½	..	101 0	81 0	46 3	43 6
"	27	63 4½	..	101 0	81 0	46 3	43 6
December	4	64 1½	..	101 0	81 0	46 9	44 0
"	11	64 1½	..	101 0	81 0	46 9	44 0
"	18	64 1½	..	101 0	81 0	46 9	44 0
"	25	64 1½	..	101 0	81 0	46 9	44 0

PRICES OF SHEEP SINCE 1818.

TABLE No. 1.—CHEVIOT SHEEP.

Year.	Wethers.		Ewes.		Lambs.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1818	28 0	to 30 0	not quoted.		8 0	to 10 0
1819	25 0	" 27 0	15 0	to 17 0	10 0	" 12 0
1820	30 0	" 25 0	16 0	" 17 0	10 0	" 11 0
1821	18 0	" 20 0	14 0	" 16 0	7 0	" 8 0
1822	12 6	" 18 0	8 0	" 8 6	4 0	" 6 0
1823	13 6	" 18 0	7 0	" 10 6	5 0	" 6 0
1824	14 0	" 19 0	7 0	" 9 0	4 0	" 6 0
1825	20 0	" 22 0	15 0	" 19 0	9 0	" 10 6
1826	17 0	" 21 6	12 0	" 15 0	7 0	" 7 6
1827	15 0	" 24 0	not quoted.		7 0	" 8 0
1828	18 0	" 27 6	12 0	to 15 0	7 0	" 8 2
1829	18 0	" 24 0	12 6	" 14 0	7 0	" 8 6
1830	15 0	" 21 0	8 0	" 11 0	6 0	" 6 9
1831	18 0	" 25 0	9 0	" 13 0	7 0	" 8 0
1832	19 0	" 24 0	11 0	" 16 0	7 0	" 8 0
1833	22 0	" 31 0	13 6	" 20 0	8 0	" 11 3
1834	22 0	" 31 0	13 6	" 21 0	9 0	" 11 6
1835	22 0	" 27 6	18 0	" 20 6	8 0	" 11 0
1836	24 0	" 31 6	16 0	" 19 0	10 0	" 14 0
1837	19 0	" 28 0	14 0	" 19 0	10 0	" 13 0
1838	23 0	" 30 6	17 0	" 22 0	12 0	" 14 0
1839	23 0	" 31 0	14 0	" 19 0	0 0	" 18 0
1840	24 0	" 33 0	15 0	" 23 0	7 0	" 11 6
1841	23 0	" 30 0	14 0	" 22 0	8 0	" 12 0
1842	22 6	" 28 0	13 0	" 17 0	7 6	" 10 0
1843	19 0	" 25 0	8 0	" 12 0	5 0	" 8 0
1844	21 0	" 29 0	10 0	" 16 0	8 0	" 10 6
1845	23 0	" 33 0	13 0	" 20 0	8 0	" 13 0
1846	24 0	" 33 6	14 6	" 21 6	10 0	" 14 6
1847	24 0	" 35 0	13 0	" 24 0	11 6	" 15 0
1848	23 0	" 34 6	13 0	" 23 0	11 6	" 15 0
1849	21 0	" 30 2	12 0	" 21 0	0 0	" 14 0
1850	20 6	" 29 6	12 0	" 20 0	8 0	" 13 0
1851	21 6	" 31 0	13 0	" 21 0	8 0	" 14 0
1852	21 0	" 32 0	15 0	" 23 0	8 0	" 14 0
1853	26 6	" 38 0	17 0	" 28 6	9 0	" 17 0
1854	25 0	" 36 0	17 0	" 26 0	9 0	" 16 6
1855	23 6	" 36 0	16 0	" 25 0	10 0	" 17 0
1856	22 0	" 35 6	15 6	" 24 0	10 0	" 15 0
1857	24 0	" 36 0	14 6	" 26 0	10 6	" 14 6
1858	24 0	" 34 6	14 0	" 24 6	10 6	" 14 0
1859	25 0	" 34 6	16 0	" 25 0	10 2	" 14 9
1860	26 0	" 38 0	17 0	" 27 6	12 6	" 17 6
1861	25 0	" 38 6	16 0	" 28 0	9 0	" 16 0
1862	27 0	" 37 6	17 6	" 28 0	10 0	" 16 0
1863	25 0	" 38 6	19 0	" 28 6	10 6	" 18 0
1864	31 0	" 41 0	21 0	" 31 6	14 0	" 18 0
1865	32 6	" 44 0	22 6	" 33 6	14 6	" 20 0
1866	37 0	" 50 0	29 0	" 42 6	15 0	" 26 0
1867	36 0	" 58 0	18 0	" 25 6	12 0	" 16 0
1868	30 0	" 32 0	15 6	" 21 0	7 6	" 13 0
1869	28 0	" 38 0	15 0	" 22 6	7 6	" 14 0
1870	35 6	" 43 0	18 0	" 28 0	10 0	" 17 0
1871	36 6	" 49 0	22 0	" 33 6	14 0	" 20 0
1872	45 0	" 56 0	22 0	" 42 0	16 0	" 22 0
1873	42 0	" 51 0	26 0	" 42 0	15 6	" 22 0
1874	33 6	" 44 6	21 0	" 36 0	12 0	" 17 0
1875	33 0	" 48 6	21 0	" 34 0	13 6	" 23 6
1876	49 0	" 52 6	28 0	" 30 0	13 6	" 25 0
1877	41 0	" 51 0	25 0	" 27 0	15 0	" 24 0
1878	35 6	" 48 0	23 6	" 25 0	14 0	" 22 0
1879	34 0	" 44 0	21 0	" 34 0	14 0	" 20 0
1880	30 0	" 48 6	20 0	" 30 0	12 6	" 20 0
1881	33 0	" 45 6	29 0	" 34 0	14 0	" 20 0
1882	40 0	" 51 0	30 0	" 40 0	14 0	" 20 6
1883	44 0	" 55 6	34 6	" 46 6	15 6	" 23 0

TABLE NO. 1.—CHEVIOT SHEEP—*Continued.*

Year.	Wethers.		Ewes.		Lambs.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1884	36 0	to 47 6	29 6	to 41 6	12 6	to 20 0
1885	30 0	" 38 0	24 0	" 31 0	12 0	" 18 0
1886	32 0	" 40 0	21 0	" 29 0	12 6	" 19 0
1887	29 0	" 36 0	18 0	" 26 0	11 0	" 16 6
1888	30 0	" 38 0	19 0	" 27 0	12 0	" 17 6
1889	36 0	" 44 0	24 0	" 32 0	14 0	" 22 0
1890	31 6	" 40 0	22 0	" 30 0	12 6	" 20 0
1891	27 0	" 38 0	16 0	" 25 0	9 0	" 16 0
1892	22 0	" 30 6	13 0	" 22 0	5 0	" 11 0
1893	24 0	" 35 6	18 0	" 28 6	8 6	" 15 0
1894	24 0	" 37 0	20 0	" 31 0	10 6	" 18 6
1895	28 0	" 39 0	22 0	" 33 0	11 6	" 19 6
1896	24 6	" 34 0	19 0	" 30 6	9 0	" 16 6
1897	27 0	" 36 0	21 0	" 31 6	11 0	" 17 6
1898	27 0	" 37 0	22 0	" 32 6	12 0	" 18 6
1899	24 0	" 33 0	20 0	" 30 6	10 6	" 16 0
1900	26 0	" 36 0	22 0	" 32 6	12 0	" 17 0
1901	25 0	" 32 6	20 0	" 29 6	11 0	" 16 0
1902	24 0	" 31 6	18 0	" 27 0	9 6	" 14 6
1903	26 0	" 34 0	21 0	" 31 0	11 4	" 18 0
1904	28 6	" 36 6	23 0	" 32 6	13 0	" 20 0
1905	27 6	" 35 0	23 0	" 33 0	14 0	" 21 0
1906	30 0	" 38 0	26 0	" 34 6	15 0	" 23 0
1907	28 0	" 34 6	22 0	" 30 6	13 6	" 19 6
1908	26 0	" 32 6	21 0	" 27 6	11 6	" 17 0
1909	24 0	" 31 0	19 0	" 25 6	9 6	" 16 0
1910	27 0	" 35 0	22 0	" 31 0	12 0	" 20 0
1911	24 0	" 31 6	18 6	" 27 6	10 6	" 18 0
1912	26 0	" 34 6	22 0	" 31 0	12 0	" 21 0
1913	30 0	" 39 0	24 0	" 35 6	16 0	" 24 0
1914	32 6	" 41 0	28 0	" 39 0	18 0	" 27 6
1915	36 0	" 46 0	31 6	" 44 0	20 0	" 30 6
1916	40 6	" 51 0	34 0	" 49 0	22 0	" 34 6
1917	43 6	" 56 0	38 0	" 56 0	24 0	" 34 0
1918	50 0	" 66 0	42 0	" 61 0	25 0	" 37 0
1919	58 0	" 69 0	44 6	" 67 0	28 0	" 40 6
1920	56 0	" 91 0	48 0	" 79 0	34 0	" 49 0
1921	45 0	" 60 0	52 3	" 85 9	38 9	" 52 3
1922	40 0	" 56 0	56 0	" 90 6	27 0	" 50 0
1923	44 0	" 65 6	61 0	" 106 0	39 0	" 62 0

Year.	Wethers.		Ewes.		Lambs.			
	s. d.	s. d.	s. d.	s. d.	Wethers.		Ewes.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1924	41 0	to 61 0	60 0	to 100 0	31 6	to 58 0	40 0	to 85 6
1925	39 3	" 50 0	56 0	" 88 9	22 3	" 50 6	26 0	" 82 0
1926	35 0	" 49 3	34 6	" 64 6	26 3	" 42 0	28 6	" 66 6
1927	28 9	" 46 3	32 6	" 55 6	23 3	" 39 0	25 3	" 52 0
1928	28 3	" 48 6	30 6	" 55 6	22 9	" 47 9	23 0	" 45 0
1929	33 6	" 54 6	34 9	" 52 0	25 6	" 47 0	30 6	" 51 9
1930	36 0	" 54 0	35 0	" 74 6	24 0	" 47 3	30 0	" 59 0
1931	24 0	" 45 6	28 0	" 50 9	17 0	" 37 0	31 0	" 57 6
1932	16 0	" 26 6	18 0	" 36 6	10 0	" 24 6	12 0	" 33 0
1933	16 0	" 28 0	25 3	" 40 0	16 6	" 31 6	19 6	" 33 0
1934	16 0	" 34 3	22 6	" 44 6	19 6	" 38 3	18 6	" 43 0
1935	22 0	" 37 3	24 0	" 44 3	16 0	" 33 3	17 0	" 40 6
1936	24 6	" 50 0	28 0	" 55 0	18 6	" 37 6	23 0	" 49 6
1937	34 6	" 49 6	29 9	" 76 6	19 0	" 45 3	27 0	" 68 0
1938	17 0	" 39 6	20 9	" 64 0	10 9	" 31 6	16 0	" 44 3
1939	19 0	" 42 9	18 6	" 43 3	11 6	" 39 9	17 0	" 48 6
1940	31 0	" 64 0	22 6	" 60 0	15 6	" 41 0	16 0	" 49 3
1941	36 6	" 68 9	26 6	" 71 0	18 3	" 59 0	23 6	" 88 0
1942	37 0	" 67 3	32 6	" 90 0	20 6	" 59 6	30 3	" 102 0
1943	39 0	" 72 9	35 6	" 140 0	23 6	" 64 0	42 0	" 153 0
1944	42 6	" 78 0	33 6	" 145 0	22 0	" 70 0	34 0	" 156 0
1945	48 6	" 92 0	34 6	" 131 0	21 6	" 69 0	38 0	" 141 0
1946	44 6	" 91 0	34 0	" 138 0	23 0	" 76 0	31 0	" 126 0

TABLE No. 2.—BLACKFACE SHEEP.

Year.	Wethers.		Ewes.		Lambs.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1819	22 0	to 24 0	12 0	to 15 0	8 0	to 9 0
1820	20 0	" 22 8	15 6	" 17 0	7 0	" 8 6
1821	18 0	" 20 6	12 0	" 13 0	6 0	" 7 0
1822	11 6	" 12 6	5 6	" 6 6	4 6	" 6 6
1823	12 0	" 16 6	5 0	" 6 6	4 0	" 5 3
1824	9 6	" 18 6	6 0	" 7 0	4 0	" 5 0
1825	22 0	" 26 0	11 0	" 13 6	6 0	" 9 0
1826	16 0	" 17 0	8 0	" 9 0	4 6	" 6 6
1827	14 0	" 18 6	7 0	" 10 0	6 0	" 7 6
1828	16 0	" 20 0	8 0	" 11 0	5 0	" 7 6
1829	14 0	" 18 0	9 0	" 10 0	6 0	" 7 0
1830	9 6	" 18 0	4 0	" 6 0	4 6	" 6 0
1831	18 0	" 17 0	5 0	" 7 6	5 0	" 6 6
1832	14 0	" 18 0	7 0	" 11 6	6 0	" 7 3
1833	16 0	" 24 0	7 6	" 12 0	6 6	" 9 0
1834	16 0	" 22 0	10 0	" 13 0	6 0	" 8 6
1835	15 0	" 18 9	10 0	" 13 0	7 0	" 8 0
1836	15 0	" 21 0	9 0	" 12 0	8 6	" 11 0
1837	13 0	" 16 0	8 0	" 12 0	8 0	" 9 6
1838	15 0	" 20 6	10 0	" 13 0	not quoted.	
1839	15 0	" 22 0	10 0	" 12 0	7 0	to 8 3
1840	15 0	" 22 6	11 0	" 12 6	7 0	" 9 3
1841	16 0	" 20 6	9 0	" 11 0	6 0	" 8 0
1842	14 0	" 19 0	7 6	" 8 0	5 6	" 7 0
1843	not quoted.		4 9	" 6 6	not quoted.	
1844	15 0	to 21 0	6 6	" 10 0	5 0	to 8 0
1845	14 0	" 23 0	8 0	" 12 0	6 0	" 8 0
1846	13 0	" 24 6	10 0	" 13 0	8 0	" 9 0
1847	20 6	" 25 0	10 0	" 14 0	8 6	" 9 6
1848	20 0	" 24 0	11 3	" 12 0	8 6	" 10 0
1849	not quoted.		not quoted.		7 0	" 7 6
1850	...		...		7 0	" 0 0
1851	17 6	to 23 0	9 0	to 12 0	6 6	" 8 0
1852	18 6	" 22 0	9 6	" 12 0	4 6	" 7 9
1853	23 0	" 27 0	14 6	" 16 6	8 0	" 11 6
1854	20 0	" 26 0	11 0	" 16 6	8 0	" 10 6
1855	23 6	" 26 6	14 0	" 16 0	10 0	" 11 0
1856	17 0	" 24 0	10 0	" 20 0	7 6	" 10 0
1857	20 0	" 29 0	10 6	" 15 0	9 3	" 11 0
1858	20 0	" 27 6	9 9	" 18 9	8 3	" 10 6
1859	20 0	" 28 0	10 0	" 14 0	8 9	" 11 0
1860	21 0	" 27 3	11 0	" 16 0	10 0	" 13 6
1861	21 0	" 29 0	12 0	" 22 0	6 3	" 14 0
1862	16 9	" 27 0	12 0	" 18 6	6 0	" 12 0
1863	20 0	" 30 6	13 0	" 16 0	8 0	" 11 6
1864	25 0	" 30 0	13 0	" 19 0	10 0	" 13 6
1865	18 6	" 32 6	16 6	" 25 0	10 0	" 17 0
1866	31 6	" 40 0	20 0	" 26 0	13 6	" 22 6
1867	20 0	" 30 6	14 0	" 22 0	7 6	" 13 6
1868	20 0	" 26 0	10 6	" 13 6	7 0	" 13 0
1869	22 0	" 28 0	11 0	" 14 0	6 9	" 9 0
1870	27 0	" 32 6	13 0	" 22 0	8 0	" 14 6
1871	23 0	" 37 0	13 0	" 23 0	11 0	" 16 3
1872	31 6	" 46 0	13 0	" 32 0	12 6	" 18 0
1873	28 0	" 39 0	16 6	" 27 0	7 0	" 16 0
1874	25 0	" 35 0	13 0	" 30 0	7 0	" 14 0
1875	26 6	" 37 6	15 0	" 31 3	9 6	" 17 6
1876	30 0	" 40 0	19 0	" 34 0	13 0	" 20 6
1877	25 0	" 33 9	13 0	" 35 0	13 6	" 23 0
1878	30 0	" 36 0	17 0	" 33 0	12 0	" 22 0
1879	25 0	" 35 9	16 0	" 34 0	10 6	" 20 0
1880	25 0	" 38 0	16 6	" 32 6	10 0	" 17 0
1881	30 0	" 39 0	15 0	" 33 0	10 0	" 15 0
1882	23 0	" 46 0	20 0	" 36 0	12 6	" 18 6
1883	26 0	" 50 6	24 6	" 33 0	14 0	" 21 6
1884	29 0	" 43 6	19 6	" 33 0	13 0	" 19 6
1885	24 0	" 34 0	13 0	" 23 6	10 0	" 15 0
1886	25 0	" 34 0	12 0	" 23 0	10 6	" 16 0
1887	22 0	" 30 0	11 0	" 19 0	8 0	" 13 0
1888	22 0	" 33 0	13 0	" 34 0	10 0	" 15 0
1889	26 0	" 40 0	13 0	" 29 0	13 0	" 22 0

TABLE NO. 2.—BLACKFACE SHEEP—Continued.

Year.	Wethers.				Ewes.				Lambs.						
	s.	d.	to	s.	d.	s.	d.	to	s.	d.	to	s.	d.		
1890	24	0	to	27	0	14	0	to	27	0	10	6	to	19	0
1891	21	0	"	27	0	10	0	"	24	0	7	6	"	15	0
1892	16	0	"	28	6	6	0	"	17	0	8	0	"	10	0
1893	21	0	"	27	0	12	0	"	24	0	7	0	"	14	0
1894	20	0	"	27	0	14	6	"	28	6	8	6	"	16	6
1895	23	0	"	41	0	16	0	"	28	6	9	0	"	17	0
1896	19	0	"	25	4	12	0	"	24	0	6	0	"	13	6
1897	21	0	"	26	6	15	0	"	25	6	7	0	"	14	6
1898	22	0	"	27	0	16	0	"	26	6	8	0	"	15	0
1899	20	0	"	28	6	18	0	"	24	0	5	6	"	13	0
1900	23	0	"	26	0	16	0	"	26	6	8	0	"	15	6
1901	20	0	"	26	0	14	0	"	25	6	6	6	"	14	6
1902	18	6	"	24	0	12	0	"	24	0	6	0	"	14	0
1903	21	0	"	26	0	15	0	"	28	0	7	0	"	16	6
1904	23	0	"	28	6	18	0	"	30	0	8	6	"	17	6
1905	21	6	"	27	0	19	0	"	31	0	9	0	"	18	6
1906	23	0	"	28	0	20	0	"	33	0	10	0	"	19	6
1907	21	0	"	23	6	17	0	"	28	0	8	6	"	17	6
1908	19	6	"	20	0	16	0	"	24	6	8	0	"	16	0
1909	17	0	"	23	0	11	6	"	22	0	6	2	"	13	0
1910	21	0	"	22	6	16	0	"	27	6	8	0	"	17	0
1911	19	0	"	29	6	14	0	"	24	0	7	0	"	15	0
1912	21	6	"	22	6	17	0	"	27	6	9	6	"	17	6
1913	24	6	"	36	0	21	0	"	31	0	12	6	"	21	6
1914	27	0	"	38	6	25	0	"	34	6	15	6	"	24	0
1915	31	0	"	42	6	29	0	"	39	6	17	0	"	25	6
1916	33	0	"	46	6	31	0	"	42	0	19	0	"	27	6
1917	36	0	"	51	0	33	0	"	47	0	21	0	"	30	0
1918	41	0	"	56	0	36	0	"	50	0	27	0	"	33	0
1919	44	0	"	62	0	39	0	"	54	0	29	0	"	36	0
1920	46	0	"	66	0	44	0	"	62	0	31	0	"	43	0
1921	52	9	"	66	9	53	3	"	62	6	20	3	"	47	0
1922	40	3	"	63	0	40	6	"	74	0	18	0	"	44	0
1923	46	0	"	65	6	43	0	"	78	0	21	0	"	45	6
1924	46	0	"	68	6	45	6	"	85	0	25	0	"	55	6
1925	36	0	"	60	0	40	0	"	78	0	17	6	"	44	0

Year.	Wethers.				Ewes.				Lambs.							
	s.	d.	to	s.	d.	s.	d.	to	s.	d.	to	s.	d.			
1926	30	0	to	54	0	31	0	to	70	0	21	9	to	49	0	
1927	26	6	"	48	0	26	0	"	64	0	17	9	"	49	0	
1928	29	0	"	45	9	24	0	"	57	0	16	6	"	38	6	
1929	29	9	"	46	0	29	0	"	64	0	20	9	"	43	0	
1930	31	6	"	45	0	28	6	"	60	0	20	0	"	45	9	
1931	19	6	"	29	9	15	0	"	38	0	14	3	"	36	9	
1932	13	0	"	19	6	15	0	"	29	0	7	8	"	13	6	
1933	20	0	"	34	0	12	9	"	19	3	11	0
1934	22	6	"	44	0	16	0	"	25	3	16	6
1935	26	0	"	40	0	16	0	"	26	9	10	0
1936	27	6	"	48	0	18	6	"	37	6	16	0
1937	32	0	"	54	0	22	6	"	39	3	21	6
1938	22	0	"	50	0	12	6	"	28	0	10	6
1939	17	6	"	40	0	12	6	"	24	6	12	0
1940	22	6	"	50	0	16	0	"	35	3	14	6
1941	27	6	"	52	6	19	0	"	45	0	21	6
1942	28	0	"	51	0	16	9	"	39	6	18	0
1943	34	0	to	61	9	32	6	"	68	0	21	9	"	44	0	
1944	37	0	"	70	6	30	6	"	66	0	23	6	"	48	0	
1945	45	0	"	67	9	30	0	"	69	0	22	3	"	54	9	
1946	52	6	"	76	0	34	0	"	71	0	26	6	"	49	6	

TABLE No. 3.—PRICE OF WOOL, PER STONE OF 24 LB., SINCE 1818.

Year.	Laid Cheviot.		White Cheviot.		Laid Highland.		White Highland.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1818	40 0	to 42 2	..	..	26 0	to 22 6	..	..
1819	21 0	" 22 0	..	..	10 0	" 10 2	..	..
1820	20 0	" 22 0	..	..	9 0	" 10 0	..	..
1821	18 0	" 20 0	..	..	9 0	" 10 0	..	..
1822	12 6	" 14 6	..	..	5 0	" 6 6	..	..
1823	9 0	" 10 6	..	..	5 0	" 5 9	..	..
1824	18 6	" 15 0	..	..	6 0	" 6 2	..	..
1825	10 6	" 22 0	..	..	10 0	" 10 6	..	..
1826	11 0	" 14 0	..	..	5 0	" 5 6	..	..
1827	11 0	" 14 0	..	..	5 0	" 6 2	..	..
1828	8 0	" 11 0	..	..	5 6	" 6 0	..	..
1829	8 0	" 11 0	..	..	4 2	" 0 0	..	..
1830	9 6	" 11 0	..	..	4 6	" 5 0	..	..
1831	17 0	" 20 0	..	..	7 6	" 8 6	..	..
1832	14 0	" 16 0	..	..	7 0	" 7 6	..	..
1833	18 0	" 20 7	..	..	10 0	" 11 0	..	..
1834	21 0	" 24 6	..	..	5 6	" 7 0	..	..
1835	19 0	" 20 6	..	..	9 6	" 10 2	..	..
1836	21 0	" 25 0	..	..	10 0	" 14 0	..	..
1837	12 0	" 14 0	..	..	7 0	" 7 8	..	..
1838	19 0	" 22 6	..	..	6 0	" 10 0	..	..
1839	18 0	" 20 0	..	..	8 0	" 12 0	..	..
1840	15 0	" 0 0	..	..	7 0	" 0 0	..	..
1841	15 0	" 16 9	..	..	6 0	" 7 5	..	..
1842	12 6	" 14 0	..	..	not quoted.	..	..	..
1843	9 0	" 11 6	..	..	5 0	to 6 0	..	..
1844	15 0	" 18 0	..	..	not quoted.	..	..	..
1845	14 6	" 17 6	..	..	7 6	to 8 6	..	..
1846	12 0	" 14 6	..	..	8 0	" 8 6	..	..
1847	12 6	" 14 0	..	..	not quoted.	..	..	..
1848	9 6	" 11 0	..	..	4 9	to 0 0	..	..
1849	12 0	" 16 6	..	..	6 0	" 6 2	..	..
1850	15 0	" 17 6	..	..	8 0	" 8 6	..	..
1851	12 0	" 16 0	..	..	8 0	" 9 2	..	..
1852	18 0	" 15 0	..	..	8 0	" 9 0	..	..
1853	19 0	" 22 0	..	..	11 0	" 12 6	..	..
1854	12 0	" 15 0	..	..	7 6	" 8 6	..	..
1855	14 6	" 19 0	..	..	8 6	" 9 0	..	..
1856	19 0	" 21 6	..	..	11 0	" 0 0	..	..
1857	19 0	" 24 0	..	..	18 0	" 14 2	..	..
1858	15 0	" 17 0	..	..	8 9	" 10 0	..	..
1859	18 6	" 24 0	..	..	10 9	" 11 6	..	..
1860	22 0	" 22 0	37 0	to 38 0	10 0	" 11 2	..	..
1861	19 6	" 27 0	from 30s. upwards.	..	not quoted.	..	..	..
1862	18 6	" 26 0	30 0	to 37 0	11 6	to 16 0	..	..
1863	25 6	" 31 0	38 0	" 42 0	15 2	" 17 6	..	..
1864	31 0	" 39 0	47 0	" 54 0	17 6	" 20 0	..	..
1865	28 0	" 30 0	44 0	" 45 0	15 0	" 17 0	..	..
1866	24 0	" 30 0	20 0	" 28 0	14 0	" 16 0	..	..
1867	16 0	" 21 6	not quoted.	..	not quoted.	..	..	..
1868	19 0	" 26 0	28 0	to 32 0	8 6	to 9 0	..	..
1869	18 0	" 26 6	not quoted.	..	8 6	" 10 0	..	..
1870	15 0	" 23 6	25 0	to 26 0	9 6	" 0 0	..	..
1871	20 0	" 26 6	20 0	" 24 6	12 0	" 15 0	..	..
1872	26 0	" 37 6	40 0	" 48 0	18 0	" 21 0	..	..
1873	17 0	" 18 0	34 0	" 40 0	9 0	" 12 0	..	..
1874	18 6	" 26 6	30 0	" 34 0	9 6	" 12 0	..	..
1875	25 0	" 32 0	34 6	" 36 0	12 6	" 16 0	..	..
1876	30 0	" 24 0	30 0	" 34 6	9 6	" 12 0	..	..
1877	30 0	" 26 0	28 0	" 30 0	10 0	" 12 0	..	..
1878	18 9	" 25 0	27 0	" 32 0	8 6	" 11 6	..	..
1879	15 0	" 17 0	prices very low.	..	7 0	" 0 0	..	..
1880	30 0	" 24 0	30 0	to 32 0	10 6	" 11 6	14 0	" 15 0
1881	17 0	" 21 0	27 0	" 30 0	5 0	" 9 6	12 0	" 13 0
1882	14 0	" 18 0	27 6	" 32 0	7 6	" 9 0	18 0	" 14 0
1883	13 0	" 18 0	26 0	" 28 0	6 6	" 8 6	11 6	" 12 6
1884	13 0	" 18 0	26 0	" 28 0	6 6	" 8 6	11 6	" 12 6
1885	12 0	" 17 0	22 6	" 26 0	6 0	" 8 0	11 6	" 12 0
1886	13 0	" 16 0	23 0	" 27 6	6 6	" 8 6	11 6	" 12 0
1887	14 0	" 22 0	23 0	" 28 0	7 0	" 9 0	11 6	" 12 0
1888	13 0	" 20 0	23 0	" 28 0	7 0	" 9 0	11 0	" 12 6

TABLE No. 3.—PRICE OF WOOL—*Continued.*

Year.	Laid Cheviot.		White Cheviot.		Laid Highland.		White Highland.	
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
1889	18 0	to 18 0	24 0	to 28 0	7 0	to 9 0	11 0	to 12 6
1890	18 0	" 18 0	24 0	" 28 0	7 0	" 9 0	11 0	" 12 6
1891	12 6	" 18 0	22 0	" 28 0	7 0	" 9 0	11 0	" 12 6
1892	12 0	" 18 0	20 0	" 28 0	7 0	" 8 6	10 6	" 12 0
1893	12 0	" 17 0	20 0	" 27 0	7 0	" 8 0	10 0	" 12 0
1894	12 0	" 16 6	20 0	" 26 0	7 0	" 8 0	10 0	" 12 0
1895	12 0	" 16 0	20 0	" 25 0	7 0	" 8 0	10 0	" 11 6
1896	11 0	" 15 0	19 0	" 24 0	7 0	" 8 0	10 0	" 11 6
1897	11 0	" 14 0	18 0	" 23 0	7 0	" 8 0	10 6	" 12 0
1898	10 6	" 12 6	16 0	" 20 0	7 0	" 8 0	10 0	" 11 6
1899	10 0	" 12 0	18 0	" 18 6	7 0	" 8 0	8 6	" 9 6
1900	9 9	" 12 0	18 0	" 18 6	6 9	" 7 9	8 0	" 9 6
1901	9 6	" 10 0	11 8	" 16 6	5 9	" 6 6	8 0	" 9 0
1902	9 0	" 10 0	11 6	" 17 0	6 0	" 6 6	8 6	" 9 6
1903	10 0	" 12 0	15 0	" 18 0	7 0	" 8 0	11 6	" 12 6
1904	15 0	" 17 0	20 0	" 21 0	9 0	" 10 0	14 0	" 15 0
1905	17 0	" 20 0	24 0	" 26 0	10 0	" 11 0	15 0	" 16 0
1906	18 0	" 21 0	27 6	" 28 6	11 6	" 13 0	16 6	" 17 6
1907	"	"	22 0	" 24 0	11 0	" 12 6	16 0	" 17 0
1908	"	"	16 0	" 18 0	†		8 0	" 8 6
1909	"	"	24 0	" 26 0	†		12 6	" 14 0
1910	"	"	25 0	" 30 0	†		13 0	" 14 6
1911	"	"	25 0	" 30 0	†		13 0	" 14 6
1912	"	"	24 0	" 29 0	†		14 0	" 15 0
1913	"	"	25 0	" 30 0	†		17 0	" 18 0
1914	"	"	24 0	" 29 0	†		16 0	" 18 6
1915†	"	"	42 0	" 46 0	†		21 0	" 22 0

* No Cheviots smeared now.

† No Highlands smeared now.

‡ These are July prices.

PRICE OF WOOL PER STONE OF 24 LB.—Continued.

		CHEVIOT.				HALF-BRED.				BLACK-FACE.		CROSS-BRED (BLACKFACE EWE AND LEICESTER RAM).			
		Hogg.		EWE AND WETHER.		Hogg.		EWE AND WETHER.		Hogg.	EWE AND WETHER.	Hogg.		EWE AND WETHER.	
Washed.	Un- washed.	Washed.	Un- washed.	Washed.	Un- washed.	Washed.	Un- washed.	Washed.	Un- washed.	Washed.	Un- washed.	Washed.	Un- washed.		
1 1916	{ CAITHNESS & SUTH- ERLAND	s. d. 36 6	s. d. 80 0	s. d. 33 0	s. d. 27 6	s. d. 34 6	s. d. 28 6	s. d. 33 0	s. d. 27 6	s. d. 23 0	s. d. 23 0	s. d. 28 6	s. d. 25 6	s. d. 28 6	s. d. 25 6
		40 0	32 6	34 0	29 0	35 0	29 0	34 0	28 6						
1 1917	{ CAITHNESS & SUTH- ERLAND	40 6	33 6	37 0	31 0	38 6	31 6	37 0	31 0	25 6	25 6	31 6	28 6	31 6	28 6
		44 6	36 0	37 6	32 6	39 0	32 6	37 6	31 6						
1 1918	{ CAITHNESS & SUTH- ERLAND	48 6	35 6	39 6	33 0	41 0	33 6	39 6	33 0	27 0	27 0	33 6	30 6	33 6	30 6
		47 6	38 6	40 0	34 6	41 6	34 6	40 0	33 6						
1919	{ CAITHNESS & SUTH- ERLAND	54 6	70 0	82 0	66 0	82 0	62 0	70 0	58 0	34 0	34 0	46 0	39 0	44 0	38 0
		88 0	74 0	84 0	68 0	84 0	63 0	72 0	60 0						
1920	{ CAITHNESS & SUTH- ERLAND	86 0	70 0	83 0	66 0	74 0	54 0	65 0	50 0	24 0	24 0	35 0	29 0	34 0	27 0
		90 0	74 0	87 0	68 0	76 0	56 0	68 0	52 0						
1921	{ CAITHNESS & SUTH- ERLAND	22 0	17 0	19 0	15 0	18 6	14 6	16 0	13 0	9 6	9 6	12 0	10 0	12 0	10 0
		23 0	18 0	20 0	16 0	19 6	15 6	17 0	14 0						
1922	{ CAITHNESS & SUTH- ERLAND	30 0	25 6	26 0	22 0	26 0	20 0	22 0	18 0	16 0	16 0	16 6	15 0	16 6	15 0
		31 6	26 0	27 0	23 0	27 0	21 0	23 0	19 0						
1923	{ CAITHNESS & SUTH- ERLAND	41 0	34 0	36 0	30 0	33 0	27 0	30 0	25 0	17 6	17 6	20 0	18 0	20 0	18 0
		43 0	35 0	37 0	31 0	34 0	28 0	31 0	26 0						
1924	{ CAITHNESS & SUTH- ERLAND	58 0	49 0	53 0	45 0	49 0	40 0	45 0	39 0	25 6	25 6	34 6	30 6	33 0	30 0
		60 0	50 0	54 0	46 0	50 0	41 0	46 0	40 0						
1925	{ CAITHNESS & SUTH- ERLAND	39 0	34 0	36 0	30 0	33 6	28 6	32 0	27 0	25 6	25 6	26 0	23 6	25 6	23 0
		40 0	35 0	37 0	31 0	34 0	29 0	33 0	28 0						
1926	Do.	35 0	29 0	32 0	28 0	32 0	26 6	28 0	24 6	19 0	19 0	22 6	20 0	22 0	19 6
		36 0	30 0	33 0	29 0	33 0	27 6	29 0	25 6						
1927	Do.	38 0	31 0	35 0	31 0	34 6	29 6	32 0	27 6	24 0	24 0	27 0	25 6	27 0	25 0
		39 0	32 0	36 0	32 0	35 0	30 0	33 0	28 6						
1928	Do.	51 0	43 0	48 0	41 0	47 0	40 0	48 0	37 0	24 6	24 6	33 0	31 0	32 0	30 0
		52 0	44 0	49 0	42 0	48 0	41 0	44 0	38 0						
1929		37 0	32 0	34 0	29 0	34 0	29 0	32 0	27 0	24 0	24 0	27 0	25 0	28 0	24 0
1930		23 0	19 0	22 0	18 0	21 0	17 6	20 0	16 6	12 0	12 0	17 6	15 6	16 6	15 6
1931		16 6	13 6	15 6	13 0	15 0	13 0	15 6	11 6	11 0	11 0	12 0	10 6	11 6	10 0
1932		14 6	11 6	14 0	11 6	12 6	11 6	11 6	9 6	8 0	8 0	9 0	8 6	8 0	7 6
1933		30 0	17 0	19 0	16 0	18 0	16 0	17 0	14 0	11 6	11 6	12 0	11 0	11 6	11 0
1934		21 6	17 6	21 0	17 0	19 0	17 0	17 0	14 0	10 0	10 0	12 0	11 0	12 0	11 0
1935		26 0	21 0	24 6	19 6	21 6	19 0	19 0	17 0	10 6	10 6	14 0	12 6	14 0	12 6
1936		37 0	22 0	25 6	20 0	21 6	19 0	19 0	17 0	14 0	14 0	17 0	16 0	17 0	16 0
1937		39 0	25 0	28 0	23 6	24 6	21 6	23 6	20 0	16 0	16 0	22 0	20 0	22 0	20 0
1938		22 0	19 6	21 6	18 6	21 0	18 6	20 0	18 6	13 0	12 0	16 0	14 6	16 0	14 6
1939		26 0	22 0	25 6	21 6	24 0	21 6	23 6	21 6	15 0	15 0	21 0	19 0	21 0	19 0
1 1940		37 0	30 6	37 0	30 6	33 0	29 6	33 0	29 6	25 0	25 0	28 6	26 0	28 6	26 0
1 1941		42 0	35 6	42 0	35 6	37 6	34 0	37 6	34 0	29 0	29 0	33 0	30 0	33 0	30 0
1 1942		47 0	40 0	47 0	40 0	42 0	38 6	42 0	38 6	33 0	33 0	37 0	34 0	37 0	34 0
1 1943		47 0	40 0	47 0	40 0	42 0	38 6	42 0	38 6	33 0	33 0	37 0	34 0	37 0	34 0
1 1944		47 0	40 0	47 0	40 0	42 0	38 6	42 0	38 6	33 0	33 0	37 0	34 0	37 0	34 0
1 1945		47 0	40 0	47 0	40 0	42 0	38 6	42 0	38 6	33 0	33 0	37 0	34 0	37 0	34 0
1 1946		47 0	40 0	47 0	40 0	42 0	38 6	42 0	38 6	33 0	33 0	37 0	34 0	37 0	34 0

1 The prices given were prices fixed by Government, and not free market prices.

Premiums awarded by the Society, 1946.

VETERINARY DEPARTMENT.

CLASS EXAMINATIONS, 1946.

Silver Medals were awarded to the following :—

GLASGOW VETERINARY COLLEGE.

Chemistry	Kenneth Hosie, Glasgow.
Biology	Kenneth Hosie, Glasgow.
Senior Anatomy	Edith Gordon, Glasgow.
Junior Anatomy	J. B. Bennett, Bearsden.
Physiology	T. J. Dunn, Glasgow.
Animal Management	Norman Spence, West Kilbride.
Pathology	D. M'Cracken, Glasgow.
Hygiene	C. O'Hagan, Glasgow.
Surgery	G. B. Young, Glasgow.
Medicine	R. S. F. Campbell, Glasgow.
Histology	W. F. H. Jarrett, Croy.
Pharmacology	William Moors, Ayr.
Parasitology	D. M'Cracken, Glasgow.

13 Large Silver Medals, £29, 9s. 4d.

ROYAL (DICK) VETERINARY COLLEGE.

Chemistry	M. C. Lancaster, Evesham, Yorks.
Biology	E. H. Shortridge, Barnard Castle.
Senior Anatomy	R. A. H. W. Malloch, Meigle.
Junior Anatomy	G. H. S. Ashworth, Crieff.
Physiology	G. H. S. Ashworth, Crieff.
Pathology	J. C. Wilson, Longniddry.
Animal Husbandry	P. Y. Stead, Northallerton.
Surgery	G. G. Gledhill, Ashton-under-Lyne.
Medicine	J. B. Wilson, Nantwich.
Histology and Embryology	G. E. Hayes, Kendal.
Pharmacology	J. E. Huddart, Newcastle-on-Tyne.
Parasitology	J. C. Wilson, Longniddry.

12 Large Silver Medals, £27, 4s.

LOCAL GRANTS, &c., 1946.

12 Societies—Grants of £15 each for Stallions engaged	£180	0	0
16 „ 13 Grants of £12 each, 1 of £11, 10s., and 2 of £9 for Show Premiums	184	10	0
3 Grants to Agricultural Societies in Orkney	9	0	0
Grants to S.W.R.I. Federations	20	0	0
Grant to Scottish Gardens and Allotments Society, £15; Medals, £24, 6s. 6d.	39	6	6
Dry Stane Dyking Competition (Stewartry) Medals	11	13	9
22 „ Medals for Hoeing, 1945-46	22	13	10
86 „ Medals for Ploughing, 1945-46	111	6	10

Long Service Awards :—

Certificates, £214, 8s. 9d. (1945-46) ; Medals, Silver-gilt, £92, 19s. 5d. (1940-46) ; Medals, Silver, £134, 11s. 6d. (1945-46)	441	19	8
	£1020	10	7

ABSTRACT OF PREMIUMS.

Local Grants	£578	10	11
Long Service Awards	441	19	8
Veterinary Colleges (25 Medals)	56	13	4
	£1077	3	11

STATE OF THE FUNDS

OF

THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND

As at 30th NOVEMBER 1946

GENERAL FUNDS.

I. BRITISH GOVERNMENT SECURITIES—			
£25,000 3½ per cent War Loan, at 107½	.	.	£26,906 5 0
£20,000 3½ per cent Conversion Loan, at 115.	.	.	23,000 0 0
£2,500 3 per cent Do. do. at 102½	.	.	2,565 12 6
£5,000 3 per cent Funding Loan, at 108½	.	.	5,437 10 0
£1,000 3 per cent Defence Bonds, First Issue, at 100	.	.	1,000 0 0
£1,000 Do. do. Second Issue, at 100	.	.	1,000 0 0
£9,200 3 per cent Treasury Stock, at 109½	.	.	10,097 0 0
£10,000 3 per cent War Loan, at 108½	.	.	10,837 10 0
£2,300 3 per cent Savings Bonds, 1955-65, at 108½	.	.	2,439 15 0
£3,000 Do. do. 1960-70, at 109½	.	.	3,281 5 0
£2,500 Do. do. 1965-75, at 111½	.	.	2,778 2 6
			<hr/>
			£89,393 0 0
II. HERITABLE BOND—			
£2,500 at Commissioners' Rates	.	.	2,500 0 0
III. RAILWAY DEBENTURE AND PREFERENCE STOCKS—			
£18,000 London and North-Eastern Railway Co. 3 per cent Debenture Stock, at 100	.	£18,000	0 0
£12,000 Do. do. 4 per cent do., at 115	.	13,800	0 0
£17,000 London Midland and Scottish Railway Co. 4 per cent Debenture Stock, at 115	.	19,550	0 0
£1,500 Do. do. 4 per cent Preference Stock, at 83	.	1,245	0 0
£4,000 Southern Railway Co. 4 per cent Debenture Stock, at 124½	.	4,980	0 0
			<hr/>
			57,575 0 0
IV. BANK STOCKS—			
£5,400 Royal Bank of Scotland Stock, at 570 x.d.	.	£30,780	0 0
£1,800 Bank of Scotland Stock, at 85s. 7d.	.	7,702	10 0
£2,850 Barclays Bank Ltd. "B" Stock, at 93s. 6d.	.	13,323	0 0
			<hr/>
			51,806 5 0
V. COLONIAL GOVERNMENT STOCKS—			
£2,000 Western Australia 4 per cent Inscribed Stock (1942-62), at 101½ x.d.	.	£2,030	0 0
£1,120 Victorian Government 3½ per cent Consolidated Inscribed Stock (1929-49), at 108½	.	1,157	16 0
			<hr/>
			3,187 16 0
VI. DEPOSIT RECEIPTS with the Royal Bank of Scotland, Edinburgh			
			1,500 0 0
VII. ESTIMATED VALUE of Building—			
8 Eglinton Crescent, Edinburgh	.	.	5,000 0 0
VIII. ESTIMATED VALUE of Furniture, Paintings, Books, &c.			
	.	.	1,500 0 0
IX. ARREARS OF SUBSCRIPTIONS considered recoverable			
	.	.	93 7 6
X. BALANCES at 30th November 1946			
	.	.	832 15 7
			<hr/>
AMOUNT OF GENERAL FUNDS			£213,388 4 1
			<hr/>

SPECIAL FUNDS.

TWEEDEDALE GOLD MEDAL FUND—

£750 London and North-Eastern Railway Co. 4 per cent Debenture Stock, at 115.	£862 10 0
£100 3½ per cent War Loan, at 107½	107 12 6
Sum on Deposit Receipt with British Linen Bank	23 5 6
	<hr/>
	£993 8 0

FIFE AND KINROSS PERPETUAL GOLD CHALLENGE CUP FUND—

£480 London and North-Eastern Railway Co. 3 per cent Debenture Stock, at 100	£480 0 0
£201 Do. do. 4 per cent First Guaranteed Stock, at 108½	208 0 8
Sum on Deposit Receipt with British Linen Bank	26 5 8
	<hr/>
	664 6 4

PAISLEY PERPETUAL GOLD CHALLENGE CUP FUND—

£950 London and North-Eastern Railway Co. 3 per cent Debenture Stock, at 100	£950 0 0
£100 3 per cent Savings Bonds, 1955-65, at 108½	108 5 0
Sum on Deposit Receipt with British Linen Bank	52 15 0
	<hr/>
	1,111 0 0

RENFREWSHIRE PERPETUAL GOLD CHALLENGE CUP FUND—

£820 London and North-Eastern Railway Co. 3 per cent Debenture Stock, at 100	£820 0 0
£100 3 per cent Savings Bonds, 1955-65, at 108½	108 5 0
Sum on Deposit Receipt with British Linen Bank	28 16 0
	<hr/>
	957 1 0

WILLIAM TAYLOR MEMORIAL PRIZE FUND—

£510 London and North-Eastern Railway Co. 3 per cent Debenture Stock, at 100	£510 0 0
£100 3 per cent Savings Bonds, 1955-65, at 108½	108 5 0
Sum on Deposit Receipt with British Linen Bank	23 0 0
	<hr/>
	641 5 0

WILLIAM DUTHIE PERPETUAL SILVER CHALLENGE CUP FUND—

£300 2½ per cent Consolidated Stock, at 99	£297 0 0
Sum on Deposit Receipt with British Linen Bank	9 17 7
	<hr/>
	306 17 7

THE JAMES ARCHIBALD PRIZE—

£720 3¼ per cent War Loan, at 107½	£774 18 0
Sum on Deposit Receipt with Royal Bank of Scotland	30 8 3
	<hr/>
	805 6 3

KINMONTH GOLD QUAIK FUND—

£50 3½ per cent War Loan, at 107½	£53 16 3
Sum on Deposit Receipt with British Linen Bank	7 15 0
	<hr/>
	61 11 3

"DUTHIE" PRIZE FUND—

£1020 London and North-Eastern Railway Co. 3 per cent Debenture Stock, at 100	£1020 0 0
Sum on Deposit Receipt with Royal Bank of Scotland	43 13 9
	<hr/>
	1,063 13 9

THE JAMES KILPATRICK TROPHY FUND—

£600 3¼ per cent War Loan, at 107½	£645 15 0
Sum on Deposit Receipt with Royal Bank of Scotland	193 16 9
	<hr/>
	839 11 9

AMOUNT OF SPECIAL FUNDS . . . £7,444 0 11

EDINBURGH, 27th December 1946.—As Auditor of the Highland and Agricultural Society of Scotland, I have examined the Securities for the Investments as detailed in the above State of the Funds and have found them in order. The Titles to the Heritable Estate and the Bond for Sum lent on Heritable Security are certified by the Society's Law Agents to be in order.

GEO. JAMES GREGOR, C.A.

JOSHUA ROSS-TAYLOR, *Treasurer.*

JAMES R. LUMSDEN, *Chairman of Board of Directors.*

EDINBURGH, 8th January 1947.

ABSTRACT of the ACCOUNTS of the HIGHLAND and**CHARGE.**

1. BALANCES at 30th November 1945	£1,448 8 6	
2. ARREARS of Subscriptions outstanding at 30th November 1945	£97 1 0	
Whereof due by Members who have com- pounded for life, and whose arrears are thereby extinguished.	14 3 6	82 17 6
3. INTEREST AND DIVIDENDS—		
(1) Interest—		
On Heritable Bond, less Income-tax	£42 13 2	
On Railway Debenture and Preference Stocks, do.	988 0 0	
On Colonial Government Stocks, do.	87 11 8	
On British Government Stocks, do.	1,843 0 6	
On Deposit Receipts	6 18 7	
	£2,968 3 11	
(2) Dividends on Bank Stocks, less Income-tax	810 4 6	3,778 8 5
4. SUBSCRIPTIONS—		
Annual Subscriptions	£1,046 3 6	
Life Subscriptions	1,285 17 0	2,282 0 6
5. 'TRANSACTIONS'—Miscellaneous Sales and other Receipts	6 18 5	
6. INCOME-TAX repaid for year to 5th April 1946	2,713 4 6	
7. N.D.D. EXAMINATION at Auchincruive, 1945—Refund of Expenses	220 9 3	
8. INVESTMENTS realised	2,000 0 0	
9. UPLIFTED from Deposit Receipt	3,500 0 0	
SUM OF CHARGE	£16,032 7 1	

EDINBURGH, 27th December 1946.—As Auditor of the Highland and Agricultural of the Society for the year ending 30th November 1946 and have found them to be Accounts I have prepared an Account of Charge and Discharge of the Intromissions 1946, of which the above is an Abstract.

EDINBURGH, 8th January 1947.

AGRICULTURAL SOCIETY of SCOTLAND for Year 1945-1946.**DISCHARGE.**

1. ESTABLISHMENT EXPENSES—		
Salaries and Wages and Allowance for Cleaning	£3,755 6 10	
Allowance to Mrs Cowie, £100; Allowance to the late Mr Blake, £66, 6s. 8d.	156 6 8	
Fee-duty, £14, 11s. 8d.; Rates and Taxes, £99, 18s. 6d.	114 10 2	
Coal, Gas, and Electric Light	94 16 11	
Insurances, £70, 9s. 1d.; Special Annuity Premium, £51, 3s. 9d.; Superannuation Scheme, £215, 16s. 4d.; Telephone and Telegrams, £69, 5s. 6d.; Repairs and Furnishings, £59, 18s. 10d.	466 18 6	
<i>Add: Income-tax retained in 1945 and paid to Inland Revenue</i>		
	£4,662 14 1	
2. FEE to Auditor of Accounts for 1944-1945	120 0 0	
3. EDUCATION—N.D.A. Examination, 1946	0 0 0	
4. CHEMICAL DEPARTMENT—		
Fee to Chemist	£50 0 0	
Analyses for Members and Expenses	88 15 0	
	188 15 0	
5. VETERINARY DEPARTMENT—Medals to Students.	58 18 8	
6. DAIRY DEPARTMENT—N.D.D. Examination, 1945	120 8 6	
7. DAIRY DEPARTMENT, 1946—		
Expenses of N.D.D. Examination held at Auchincruive	£341 5 11	
Less Entry Fees.	195 16 6	
	145 9 5	
8. SOCIETY'S 'TRANSACTIONS'	969 7 8	
9. ORDINARY Printing, £212, 18s. 5d.; Advertising, £42; Stationery, Books, &c., £178, 7s. 5d.; Postages and Receipt Stamps, £154, 18s. 11d.	587 19 9	
10. RETIRING Allowance to Professor Stanfield, Consulting Engineer	150 0 0	
11. MISCELLANEOUS Payments	259 10 11	
12. GRANTS to Local Societies, 1945	347 9 8	
13. CERTIFICATES and Medals for Long Service	441 19 8	
14. SPECIAL GRANTS—		
Animal Diseases Research Association, £200; Glasgow Veterinary College, £150; Royal Scottish Agricultural Benevolent Institution, £100; Scottish Agricultural Organisation Society, £100; Scottish Red Cross Agriculture Fund, £115, 17s. 11d.; other Grants, £152, 2s. 0d.	817 19 11	
15. EXPENSES in connection with Show Plant, &c.	64 17 0	
16. INVESTMENTS made	3,300 13 8	
17. PLACED on Deposit Receipt	3,000 0 0	
18. ARREARS removed from Subscription List at 30th November 1946	20 5 6	
19. ARREARS of Subscriptions outstanding at 30th November 1946	93 7 6	
20. BALANCES at 30th November 1946—		
On Account Current with Royal Bank of Scotland—		
Edinburgh Account	£696 18 4	
In hands of Secretary	185 17 3	
	882 15 7	
SUM OF DISCHARGE		£16,032 7 1

Society of Scotland, I beg to report that I have examined the Books and Accounts correctly stated and sufficiently vouched and instructed. From the Books and of the Treasurer with the Funds of the Society for the year ending 30th November
GEO. JAMES GREGOR, C.A.

JOSHUA ROSS-TAYLOR, Treasurer.

JAMES R. LUMSDEN, Chairman of Board of Directors.

ABSTRACT of the ACCOUNTS of the CHARGE.

I. FUNDS at 30th November 1945—			
£3,193 London and North-Eastern Railway Company 3 per cent Debenture Stock			£2,650 0 0
£5,551, 16s. 3d. 3½ per cent Conversion Stock			4,216 18 2
£500 Queensland 3½ per cent Inscribed Stock, 1950-70			460 1 0
£412 London Midland and Scottish Railway Company 4 per cent Debenture Stock			611 10 6
£190 London Midland and Scottish Railway Company 4 per cent Guaranteed Stock			259 1 11
£400 3 per cent Savings Bonds, "A," 1955-65			400 0 0
			<hr/> £8,587 11 7
BALANCES with Royal Bank of Scotland—			
On Account Current		£58 13 4	
On Deposit Receipt		615 0 0	
		<hr/>	673 13 4
			<hr/> £9,261 4 11
II. INTEREST ON INVESTMENTS—			
On £3,193 London and North-Eastern Railway Company 3 per cent Debenture Stock, for year to 30th June 1946		£95 15 10	
Less tax		45 10 0	
		<hr/>	£50 5 10
On £5,551, 16s. 3d. 3½ per cent Conversion Stock, for year to 1st October 1946		£194 6 2	
Less tax		92 5 10	
		<hr/>	102 0 4
On £500 Queensland 3½ per cent Inscribed Stock, 1950-70, for year to 1st July 1946		£17 10 0	
Less tax		8 6 3	
		<hr/>	9 3 9
On £412 (increased to £812) London Midland and Scottish Railway Company 4 per cent Debenture Stock, for year to 30th June 1946		£24 9 6	
Less tax		11 8 7	
		<hr/>	13 0 11
On £190 London Midland and Scottish Rail- way Company 4 per cent Guaranteed Stock, for year to 30th June 1946		£7 12 0	
Less tax		3 12 2	
		<hr/>	3 19 10
On £400 3 per cent Savings Bonds, "A," 1955-65, for year to 15th August 1946		£12 0 0	
Less tax		5 14 0	
		<hr/>	6 6 0
		<hr/>	184 16 8
III. INTEREST ON DEPOSIT RECEIPT			0 19 3
IV. INCOME-TAX repaid for year to 5th April 1946			171 16 8
			<hr/>
SUM OF CHARGE			£9,618 17 6

ARGYLL NAVAL FUND for the Year 1945-1946.**DISCHARGE.****I. ALLOWANCES to four Recipients as follows :—**

4 at £60	£240 0 0
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II. INVESTMENT made—

£400 London Midland and Scottish Railway Company 4 per cent Debenture Stock .	<u>£429 15 9</u>
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III. FUNDS at 30th November 1946—

£8,198 London and North-Eastern Railway Company 3 per cent Debenture Stock .	£2,650 0 0
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£5,551, 16s. 3d. 3½ per cent Conversion Stock .	4,216 18 2
---	------------

£500 Queensland 8½ per cent Inscribed Stock, 1950-70	450 1 0
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£812 London Midland and Scottish Railway Company 4 per cent Debenture Stock .	1,041 6 3
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£190 London Midland and Scottish Railway Company 4 per cent Guaranteed Stock .	259 1 11
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£400 3 per cent Savings Bonds, "A," 1955-65 .	400 0 0
	<u>£9,017 7 4</u>

Note.—The above Funds are entered at cost price. The market value at 30th November 1946 was £11,670, 8s. 8d.

Balances with Royal Bank of Scotland—

On Account Current	£91 10 2	
On Deposit Receipt	<u>270 0 0</u>	
		<u>361 10 2</u>
		9,378 17 6

SUM OF DISCHARGE	<u>£9,618 17 6</u>
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JOSHUA ROSS-TAYLOR. *Treasurer.*

JAMES R. LUMSDEN, *Chairman of Board of Directors.*

GEO. JAMES GREGOR, C.A., *Auditor.*

VIEW OF RECEIPTS AND PAYMENTS for Year 1945-1946.**RECEIPTS.**

INTEREST AND DIVIDENDS	£3,778 8 5
INCOME-TAX REFPAID for year to 5th April 1946	2,713 4 6
	<hr/>
	£6,491 12 11
ANNUAL SUBSCRIPTIONS AND ARREARS received	1,015 8 0
	<hr/>
	£7,507 0 11

PAYMENTS.

ESTABLISHMENT EXPENSES (see page 181)	£4,662 14 1
FEE TO AUDITOR for 1944-1945	120 0 0
CHEMICAL DEPARTMENT	138 15 0
VETERINARY DEPARTMENT	58 18 8
EDUCATION	45 3 8
RETIRING ALLOWANCE TO CONSULTING ENGINEER	150 0 0
SOCIETY'S 'TRANSACTIONS'	962 9 3
ORDINARY Printing, Stationery, Advertising, and Miscellaneous Accounts	912 7 8
GRANTS TO LOCAL SOCIETIES, &c.	789 9 4
	<hr/>
	£7,839 17 8
<i>Extraordinary Expenditure—</i>	
Special Grants (see page 181)	817 19 11
	<hr/>
	8,657 17 7
DEFICIT	£1,150 16 8
<i>Extraordinary Income—</i>	
Life Subscriptions	1,235 17 0
	<hr/>
EXCESS OF RECEIPTS	£85 0 4

JOSHUA ROSS-TAYLOR, *Treasurer.*
 JAMES R. LUMSDEN, *Chairman of Board of Directors.*
 GEO. JAMES GREGOR, C.A., *Auditor.*

EDINBURGH, 8th January 1947.

PROCEEDINGS AT BOARD MEETINGS.

MEETING OF DIRECTORS, 5TH JUNE 1946.

Mr JAMES R. LUMSDEN of Arden, Dumbartonshire, in the Chair.

Present.—Ordinary Directors—Mr J. W. Alexander, M.V.O.; Mr W. J. Campbell; Mr James Durno; The Earl of Elgin and Kincardine, K.T., C.M.G.; Mr Alexander Forbes; Mr George Grant; Mr J. E. Kerr; Mr James M'Laren; Mr Ian C. Menzies, O.B.E.; Mr William Montgomery; Sir Joshua Ross-Taylor; Mr W. D. Simpson; Mr Thomas A. Wedderspoon; Mr James Wither. *Extraordinary Directors*—Major R. F. Brebner, C.B.E.; Mr Alexander Cormack; Mr J. Milne Henderson; Mr James R. Lumsden; Mr William Petrie; Mr Richard J. Singer, F.I.A.(Scot.); Mr Andrew Wilson. *Hon. Secretary*—Mr Alexander Murdoch.

The late Mr William Meiklem, Kirkcaldy.

Before proceeding with the business of the Meeting, the Chairman referred with very deep regret to the death of a former member of the Board, Mr William Meiklem, Bennochy Park, Kirkcaldy. Mr Meiklem, he said, joined the Society in 1893, so that his membership covered a period of fifty-three years. He was elected a Director in 1919, and served on the Board for various terms extending in all to a period of fifteen years.

Mr Meiklem had a highly successful career, both as an arable farmer and as a breeder of farm livestock. It was, however, as a breeder of Clydesdale horses that he earned world-wide fame. As the breeder of several outstanding examples of the breed, he would be remembered by future generations wherever Clydesdales were found, and his name would be preserved for all time in the annals of the Clydesdale breed.

He was a man of a quiet and unassuming character. He was extremely popular in farming circles, and was held in high regard and esteem by all with whom he was associated.

He took a keen practical interest in the affairs of the Society, being especially interested in the Annual Shows, at which he was a familiar figure. In 1930 he presented to the Society a valuable Gold Cup for competition in the Clydesdale Gelding Classes. This Cup was eventually won outright in 1937.

His death was a loss to the Society and to the farming community of Scotland, and would be sincerely mourned by a wide circle of friends.

A Minute of regret and sympathy was submitted and adopted, the members present upstanding, and the Secretary was instructed to forward a copy thereof to the widow of the deceased.

Post of Consulting Chemist.

Mr James Durno, Crichtie, Inverurie, expressed regret at the decision arrived at at the April meeting that no appointment be made of a Consulting Chemist to fill the vacancy caused by the death of Dr J. F. Tocher. He gave notice that, at the November meeting, he would move that the question of the appointment of a Consulting Chemist be reconsidered.

Animal Diseases Research Association.

On the motion of the Chairman, it was decided to confirm the proposed grant of £200 for the current year to the Animal Diseases Research Association.

Mr W. R. Petrie, Elgin, suggested that more attention should be devoted to the problem of Grass Sickness in Horses, and raised a question as to the possibility of raising a large fund to be offered as an award to anyone who found a cure for the disease.

After some discussion it was decided, on the suggestion of the Chairman, that, when the Secretary sent the cheque for £200 to the Animal Diseases Research Association, he should say that the Directors were much concerned about the incidence of Grass Sickness and hoped that everything was being done to find a cure.

Glasgow Veterinary College.

On the motion of the Chairman, it was decided to confirm the proposed grant of £150 for the current year to the Glasgow Veterinary College.

Attested Cattle at Shows.

A Minute of Meeting of Special Committee, appointed on 9th January, was submitted. The Minute stated that the Committee had agreed to recommend that cattle entered at the Society's Shows must be from attested herds, licensed tuberculin-tested herds, or supervised herds, or must have passed a recognised tuberculin test within two weeks of the date of closing of entries for the Show.

Entries of animals from attested or supervised herds must be accompanied by permits obtained from the Divisional Inspector of the Ministry of Agriculture for the area from which the animals were to be moved. Entries of animals from licensed tuberculin-tested herds must be accompanied by a certificate from the Licensing Authority. Entries of other animals must be accompanied by a certificate by a Veterinary Surgeon that they have passed a recognised tuberculin test within the prescribed period.

It was further agreed to recommend that the question of requiring that animals undergo a test for contagious abortion be deferred for future consideration.

On the motion of Mr J. E. Kerr of Harviestoun, Convener of the Special Committee, the recommendations contained in the Minute were adopted.

Improvement of Livestock (Licensing of Bulls) Act, 1931.

A letter was submitted from the Department of Agriculture, forwarding List containing the names and addresses of Members who were nominated some considerable time ago by the Society and appointed by the Secretary of State to the Panel of Referees constituted under Section 5 (2) of the above Act. The letter stated that, should the Society consider that the introduction of fresh blood to the Panel would be advantageous, the Department would be prepared to consider any nominations which were put forward.

It was agreed that the following additional names be submitted: Mr William Montgomery, Banks, Kirkcudbright; Mr John Niven, Glogaburn, Tibbermore; Mr James L. Whyte, Hayston, Glamis.

Sir Joshua Ross-Taylor directed attention to the difference which apparently existed between England and Scotland with respect to the standard required of bulls receiving the Government Licence. He mentioned the case of a bull from England sent for sale at St Boswells. This bull was licensed by the Ministry of Agriculture, but was turned down at St Boswells by an Inspector of the Department of Agriculture, whose decision was upheld by a member of the Panel of Referees. The bull was subsequently returned to England and relicensed by the Ministry of Agriculture.

It was agreed that this was a highly unsatisfactory position of affairs, and it was decided that the attention of the Department of Agriculture be called to the matter, in the hope that appropriate action would be taken.

The Manderston Cup.

A letter was submitted from Major C. W. H. Bailie, Manderston, Duns, containing the offer of a handsome solid Silver Challenge Cup to be awarded to the best Hunter at the Society's Annual Shows. The Cup was on view on the table.

It was unanimously agreed to accept the Cup, and the Secretary was instructed to convey to Major Bailie the Society's cordial thanks for the handsome gift.

National Diploma in Dairying.

A Minute of Meeting of Education Committee, dated 5th June, was submitted.

The Minute stated that the Committee had had under consideration Draft Regulations and Syllabus for a proposed National Diploma in Dairy Husbandry and National Diploma in Dairy Technology.

It was decided to recommend to the Board that general approval be given to the proposal to have two Diplomas instead of one as formerly. As the Draft Regulations had been received only that morning a further Meeting of the Education Committee would be held to consider them. The Board was asked to give the Committee powers to adjust and approve the Regulations as they might consider desirable.

On the motion of Sir Joshua Ross-Taylor, Convener, the Minute was approved, and the Committee was given powers to adjust and approve the Regulations and Syllabus for the new National Diplomas in Dairy Husbandry and Dairy Technology.

The Loveday Report.

Sir Joshua Ross-Taylor then referred to the Report of the Loveday Committee on Higher Agricultural Education in England and Wales. In view of certain criticisms contained in that Report regarding the National Diplomas in Agriculture and Dairying,

it had been thought well to prepare a Memorandum embodying the views of this Society's Education Committee.

Sir Joshua said that the Loveday Committee had expressed the view that these Diplomas had, in their present form, outlived their usefulness. As a result of the Society's Memorandum and of communications with the Royal Agricultural Society and with the Ministry of Agriculture, the Minister had now asked that representatives of the two Societies should appear before him later in the month to state their case for the retention of the Diplomas.

Finance.

A Minute of Meeting of Committee, dated 5th June, was submitted and approved.

The Minute dealt with the following matters :—

James Kilpatrick Trophy.—The receipt was reported of a sum of £831, 8s. 9d., being the amount raised by the James Kilpatrick Testimonial Committee and handed over by Mr Kilpatrick to the Society.

It was recommended that, in the meantime, £650 be invested in 3½ per cent War Stock and the balance placed upon Deposit Receipt.

Long Service Medals.—The Secretary had reported that, during the war years and up to that date, forty-six applications for the Society's Long Service Certificate and Gold Medal had been dealt with. These applicants had received the special framed Certificate and had been informed that they would receive the Gold Medal when gold was available. As the prospect of obtaining gold at a reasonable price was still remote, the Committee recommended that these medal winners be offered solid Silver Gilt and Enamel Medals. The present cost of gold medals was £6, 12s. 10d., including purchase tax, and the cost of the silver gilt medals was 35s. 1d.

Convener of Shows Committee.

A letter was submitted from Mr Ian M. Campbell, Bal Blair, Invershin, intimating his resignation of the Convenership of the Shows Committee owing to pressure of other business. Mr Campbell's resignation was accepted with regret.

It was unanimously agreed to appoint Captain Ian S. Robertson, Linkwood, Elgin, Convener of the Shows Committee in place of Mr Campbell.

MEETING OF DIRECTORS, 6TH NOVEMBER 1946.

Mr JAMES R. LUMSDEN of Arden, Dumbartonshire, in the Chair.

Present.—Ordinary Directors—Mr R. Scott Aiton ; Mr J. W. Alexander, M.V.O. ; Mr William Allison ; Mr Thomas Black ; The Baroness Burton ; Mr Ian M. Campbell ; Captain James Craig ; Mr Peter W. Crawford ; Mr James Durno ; The Earl of Elgin and Kincardine, K.T., C.M.G. ; Mr Alexander Forbes ; Mr George Grant ; Mr William Hogg ; Mr James Johnston ; Mr James Kilpatrick ; Mr James R. Lumsden ; Mr Ralph S. MacWilliam ; Mr J. C. Wallace Mann ; Mr Ian C. Menzies, O.B.E. ; Mr William Montgomery ; Mr John Niven ; Mr James Paton, C.B.E. ; Mr William J. Reid ; Captain Ian S. Robertson ; Mr William D. Simpson ; Mr Matthew Templeton ; Captain R. J. Thomson ; Mr James Wither. *Extraordinary Directors*—Major A. D. Campbell ; Mr Alexander Cormack ; Mr J. E. Kerr ; Mr John Kerr ; Captain R. Maclean ; Mr Andrew R. Page ; Sir Joshua Ross-Taylor ; Mr Richard J. Singer, F.I.A.(Scot.) ; Mr Francis W. Walker ; Mr James Wyllie. *Hon. Secretary*—Mr Alexander Murdoch.

The late Mr Archibald Whyte.

Before proceeding with the business of the Meeting the Chairman referred, with very deep regret, to the death of a former member of the Board, Mr Archibald Whyte, Spott, Kirriemuir. Mr Whyte's connection with the Society, he said, extended over a period of sixty-two years, he having become a member in 1884. He served as an Ordinary Director from 1928 to 1932, and also as an Extraordinary Director on several occasions.

Mr Whyte was an outstanding personality in the agricultural life of Scotland. He farmed on an extensive scale in the County of Angus, being specially interested in Aberdeen-Angus cattle and Blackface sheep, of both of which he was a successful breeder and exhibitor. His services as a judge of these classes of stock were frequently in demand.

In addition to his farming activities he found time to take an active part in public affairs. He took a prominent part in the affairs of the Angus Agricultural Association, of which he was at one time President.

While a Director he took a keen interest in the affairs of the Society, and acted as Convener of the Shows Committee on the occasion of the highly successful Show at Dundee in 1933. His outstanding integrity and kindly and courteous manner earned for him the esteem and regard of all with whom he came in contact. His death was a loss to the Society and to Agriculture generally, which would be deeply deplored by a wide circle of friends.

A Minute of regret and sympathy was submitted and adopted, the members present upstanding, and the Secretary was instructed to forward a copy to the family of the deceased.

The late Mr J. Milne Henderson.

The Chairman also referred, with very deep regret, to the death of Mr J. Milne Henderson, C.A., Edinburgh, who was elected an Extraordinary Director of the Society in January of the current year. While only recently elected a Director, he had a very long connection with the Society, having been a member since 1876. During recent years he was a regular attendee at the General Meetings of the Society, and frequently took part in discussions at these Meetings.

Mr Milne Henderson, he said, was associated with many public bodies in Edinburgh, including the Chamber of Commerce, the Merchant Company, and the Edinburgh College of Domestic Science, to all of which he gave devoted service. He was also a prominent churchman, and took an active part in the work of the various Courts of the Church.

He took a keen and practical interest in the work of the Society, where his thorough grasp of financial problems was of much value. His death was a loss to the Society which they deeply regretted.

A Minute of regret and sympathy was submitted and adopted, the members present upstanding, and the Secretary was instructed to forward a copy to the family of the deceased.

Chairman of the Board for 1946-47.

Mr Alexander Murdoch, East Hallside, Cambuslang, moved that Mr James R. Lumsden of Arden be re-elected Chairman of the Board for the ensuing year. In doing so, Mr Murdoch said there was precedent for a Chairman being retained in office for a third year. As no Show had taken place during the past two years, he thought it would be fitting that Mr Lumsden should continue as Chairman for another year, in view of the possibility of a Show being held at Inverness in 1947.

Mr William D. Simpson, Highfield, North Berwick, seconded, and Mr Lumsden's re-election was unanimously agreed to.

Mr Lumsden, in accepting office, thanked the Directors for the honour they had again conferred upon him. He would, he said, do everything in his power to secure that the necessary facilities were obtained for holding a Show at Inverness next year.

Resignation of Treasurer.

A letter was read from the Earl of Home, K.T., intimating his resignation of the office of Treasurer of the Society.

The Chairman said he was sure they would all have heard Lord Home's letter with sincere regret. They would all miss his genial presence and his wise advice. As Convener of the Finance Committee he had taken a great interest in all the affairs of the Society since he was appointed Treasurer in 1935, in succession to the late Sir Ralph Anstruther. There was no more public-spirited man in Scotland than Lord Home. His name was a household word throughout the length and breadth of the land.

He moved that the Secretary be instructed to write thanking Lord Home for all he had done for the Society, sending him their very best wishes, and expressing the hope that he would be long spared to enjoy a little more leisure than he had had for many years.

The Chairman added that the usual procedure in filling such a vacancy was to remit the matter to the Office-bearers' Committee, and this was agreed to.

Consulting Chemist.

Mr James Durno, Crichtie, Inverurie, submitted the following Motion, which appeared under his name on the Agenda: "That the Directors reconsider the question of appointing a Consulting Chemist to the Society, in place of the late Dr J. F. Tocher."

Mr Durno said that he was submitting the Motion because he felt that insufficient consideration had been given to this very important matter at the April Meeting. At that time a plea was put forward that analyses could now be obtained through Agricultural Colleges, Research Institutes, and Local Authorities. He admitted that was the case, but, notwithstanding that, the Society's Chemist received 145 samples for analysis from members in 1939 and 120 in 1945. For many years previous to 1939 the

Society's Chemist analysed not less than 200 samples on behalf of members, of which the Society paid two-thirds of the cost and the member one-third. That was a privilege which was of considerable benefit to members in the past. It had to be borne in mind also that Court proceedings could not be founded on analyses made through a College or Institute, but could be founded on an analysis made by the Society's Chemist. He felt, as did many other members, that for the Society not to have a Chemist was a very retrograde step. The Society had an obligation to its members, who understood when they joined the Society that they could have manures and feeding-stuffs analysed at a reduced figure, and they should not break faith with their members.

Mr Alexander Murdoch seconded Mr Durno's Motion.

Mr J. W. Alexander, M.V.O., Langshaw, Moffat, Convener of the Science Committee, moved as an amendment that the Directors adhere to their former decision that no Chemist be appointed. Prior to the April Meeting of the Board, the matter was fully considered by the Science Committee, whose recommendation against an appointment was accepted by the Directors. When the Committee made their decision they had figures of the analyses before them, and those figures brought out that the use taken of the Chemist's services was largely by the Aberdeen members. The bulk of the members were not taking advantage of his services. It was on these grounds and on the ground that there were many other means of getting analyses now, compared with the time when Dr Tocher was appointed, that the Science Committee put forward their recommendation.

Mr James Wither, Awhirk, Stranraer, seconded the amendment.

Mr R. Scott Aiton, Legerwood, Earlston, Vice-Convener of the Science Committee, speaking in support of the amendment, recalled the circumstances under which the appointment of a Chemist was first made by the Society, and said he agreed that conditions had greatly changed since those early days. He pointed out that, in addition to Chemists in the Colleges and Research Institutes, there were officials in the Agricultural Executive Committees all over the country to whom farmers could take their samples of soils and feeding-stuffs, and who would be able to explain verbally what farmers wanted to know. He thought the time was past when it was necessary to have a Consulting Chemist on the pay-roll of the Highland and Agricultural Society.

The Earl of Elgin and Kincardine, K.T., C.M.G., suggested that the number of members asking for analyses should not govern the question of whether or not the Society should have a Consulting Chemist. The question was much bigger than that. He thought that, in order to keep up the prestige and usefulness of the Society, they ought to have someone whom they could consult on matters of chemistry, quite independent of the number of analyses which could be dealt with through other channels.

Mr Durno, in reply to the point made by Mr Alexander that a large proportion of the samples for analyses came from Aberdeen, said it showed that the farmers in the Aberdeen area were more alive to the advantages to be obtained from membership of the Society than those in other areas. The facilities were available to all members.

On a vote being taken, 21 voted for the amendment and 14 for the motion. The decision not to appoint a Consulting Chemist was, therefore, confirmed.

First Post-War Show at Inverness.

The Special Committee appointed on 6th June 1945 to watch developments in connection with the prospects for holding a Show and take whatever action they considered desirable, submitted a Report.

The Report narrated the various meetings and negotiations which the Committee had had with the Department of Agriculture for Scotland, the Regional Licensing Officer of the Ministry of Works, and the Area Officer, Timber Control, Board of Trade. As a result of these negotiations, the Committee was advised that the proper procedure was for the Society to put up a special case to the Raw Materials Department, Board of Trade, Millbank, London, sponsored by a letter from the Department of Agriculture for Scotland and also the Ministry of Works. The Department of Agriculture had agreed, subject to the approval of the Secretary of State, to support the Society's application to the Board of Trade.

The Special Committee, in giving full details, said it would be obvious that, at the moment, there was no assurance that the material necessary for a Show in 1947 would be available. The Committee felt, however, that in the meantime preparations for the Show should proceed. If, however, timber could not be obtained, the Show would have to be abandoned, as timber was absolutely essential.

In submitting the Report, the Chairman said the Committee were going ahead with the arrangements for holding a Show, but it was only fair that the Board should be warned that they had no definite assurance that timber would be available.

The Report and actions of the Committee were approved.

Master of Works.

The Chairman said that the Special Committee were also given powers to arrange for the appointment of a Master of Works, if and when they thought that necessary.

In view of the recommendation to go ahead with the arrangements for the Show, the services of a Master of Works were essential. The Committee advertised the post and had nineteen applicants. Having interviewed a short list of three candidates, the Committee had unanimously decided to recommend the appointment of Mr Alfred E. Wilson, Sealoff Lodge South, Auldham, North Berwick.

The appointment of Mr Alfred E. Wilson as Master of Works was approved.

Inverness Show.

The Meeting then proceeded to make the following provisional arrangements for a Show at Inverness in 1947 :—

Judges.—The following were appointed a Selection Committee to draw up Panels of Judges for consideration at next Meeting : Mr R. Scott Aiton, Mr J. W. Alexander, Mr James Durno, Mr William I. Elliot, Mr George Grant, Mr William Hogg, Mr J. E. Kerr, Mr James Kilpatrick, Mr Alexander Murdoch, Mr John Niven, Mr James Paton, C.B.E., Sir Joshua Ross-Taylor, Mr Matthew Templeton, Mr James Wither, with the Chairman, *ex officio*.

Forage Committee.—The following Committee was appointed to make arrangements for the supply of Forage, and report to the Board : Mr J. E. Kerr, Mr James R. Lumsden, Captain R. Maclean, Mr Ralph S. MacWilliam, Mr James Paton, C.B.E., Captain Ian S. Robertson, Mr Francis W. Walker.

Hotel Accommodation and Catering in Showyard.—It was remitted to the Chairman of the Board, the Convener of the Shows Committee, the Convener of the Local Committee, the Steward of Catering, the Steward of Implements, the Baroness Burton, and the Secretary to make the necessary arrangements.

British Women's Temperance Association.—It was agreed to grant the British Women's Temperance Association a free site for an unlicensed Catering Stand.

Police.—It was remitted to the Secretary to make the necessary arrangements for Police supervision in the Showyard.

Music.—The Secretary was instructed to make the necessary arrangements for music in the Showyard.

Educational Exhibit.—It was decided to grant a free stand for an educational and research exhibit, provided the Agricultural Colleges and Research Institutes were prepared to stage such an exhibit.

Forestry Exhibition.—It was agreed that accommodation be granted to the Royal Scottish Forestry Society for an Exhibition of Timber, and that a grant of £40 be given towards the expenses of the Exhibition.

Show Contracts.—It was remitted to the following Committee, with powers, to deal with the Timber and other Contracts in connection with the Showyard : Mr James R. Lumsden (Convener), Mr James Durno, Mr Alexander Murdoch, Mr James Paton, C.B.E., Captain Ian S. Robertson, Sir Joshua Ross-Taylor, Mr William D. Simpson, Mr Francis W. Walker.

Prize List and Regulations.—The Secretary stated that the Shows Committee had met on 5th November, and had revised the Prize List and Regulations for the Inverness Show.

It was agreed that, as usual, their Report be circulated for consideration in detail at next Meeting of the Board.

Special Prize.—The following Special Prize was accepted, and a vote of thanks accorded to the donor :—

Clydesdale Horse Society.—Cawdor Challenge Cup for the best Clydesdale Mare or Filly, on the same conditions as formerly.

Tuberculosis Eradication.

A letter was submitted from the Ministry of Agriculture and Fisheries, dated 15th July, forwarding copies of a confidential Memorandum, "Notes on Tuberculosis Eradication Schemes," which had been prepared as a basis for discussion with farming interests. It was proposed, at a later date after the Society had had an opportunity of considering the Memorandum, to arrange a meeting in Edinburgh with representatives of the Society, under the auspices of the Department of Agriculture for Scotland.

It was agreed that the letter and Memorandum be remitted to the Science Committee for consideration and report.

Inspection of Growing Crops of Potatoes.

A letter was submitted from the Department of Agriculture for Scotland in which it was stated that, owing to the unusual prevalence of leaf-roll in certain potato crops in Scotland and England and Wales this year, the total quantity of "certified" seed available for planting in 1947 was likely to fall below the quantities which had been

available in recent years. The Minister of Agriculture and Fisheries had accordingly issued a general licence authorising the planting and sale for planting within the Protected Area in England in 1947 of potatoes from crops grown in Scotland and England and Wales this year which it had not been possible to certify under the Departmental Schemes because of leaf-roll infection, and which were the subject of a "1946 Sub-standard Report" issued by the Department or the Ministry of Agriculture and Fisheries.

Inspection of Consignments of Seed Potatoes.

A letter was submitted from the Department of Agriculture for Scotland, stating that the Department had arranged with the Ministry of Food for the "Check" inspection of seed potato consignments to be restarted for the season on Monday, 7th October. The scheme would be operated on similar lines to those of the past two seasons, and, on this occasion, twelve pairs of Inspectors would eventually be employed.

Panel of Arbiters.

A letter was read from the Department of Agriculture for Scotland, dated 12th September, forwarding copy of the Panel of Arbiters constituted under Section 17 of the Agricultural Holdings (Scotland) Act, 1923, and inviting the Society to submit, for the Department's consideration, the names and qualifications of any gentlemen whom they regarded as suitable for appointment to the Panel.

On calling for nominations, two names were put forward. The Chairman said that if any other names, together with the necessary particulars, were handed to the Secretary these would be forwarded to the Department in due course.

Post-War Wool Marketing.

Captain James Craig, Crieff, reported on further negotiations which had taken place with regard to Post-War Wool Marketing. Agreement had now been reached between the three Farmers' Unions of the United Kingdom with regard to a United Kingdom Producers' Wool Marketing Scheme under the Agricultural Marketing Acts. The scope of the scheme and the general lines on which it was proposed it should be operated were detailed in a letter, copy of which was submitted, signed by the Presidents of the three Unions and addressed simultaneously to the Ministry of Agriculture for England and Wales, the Department of Agriculture for Scotland, and the Ministry of Agriculture for Northern Ireland.

Finance.

A Minute of Meeting of Committee, dated 6th November, was submitted and approved.

The Minute dealt with the following matters:—

Members' Subscriptions.—The Secretary reported that, at that date, the amount received from Members in Life Subscriptions was about £23 more than the total received for the preceding year. There was a slight falling off in Annual Subscriptions of about £58. The number of members on Military Service was now reduced to forty-five, these being mostly members who were still abroad and with whom it had been found impossible to communicate.

Showyard Erector.—It was recommended that the salary of the Showyard Erector, Mr Frank Reid, be increased from £300 to £400. The salary would be payable in the forthcoming financial year only if it were found possible to hold a Show at Inverness in 1947.

MEETING OF DIRECTORS, 4TH DECEMBER 1946.

Mr JAMES R. LUMSDEN of Arden, Dumbartonshire, in the Chair.

Present.—Ordinary Directors—Mr R. Scott Aiton; Mr J. W. Alexander, M.V.O.; Mr William Allison; Mr Thomas Black; The Baroness Burton; Captain James Craig; Mr Peter W. Crawford; Mr James Durno; Mr George Grant; Mr William Hogg; Mr James Johnston; Mr James Kilpatrick; Mr James R. Lumsden; Mr Ralph S. MacWilliam; Mr J. C. Wallace Mann; Mr Ian C. Menzies, O.B.E.; Mr A. W. Montgomerie, O.B.E.; Mr William Montgomery; Mr John Niven; Mr James Paton, C.B.E.; Mr William J. Reid; Captain Ian S. Robertson; Mr William D. Simpson; Mr Matthew Templeton; Mr Thomas A. Wedderspoon; Mr James Wither. *Extraordinary Directors*—Mr Alexander Cormack; Mr William I. Elliot; Mr J. E. Kerr; Mr John Kerr; Captain R. Maclean; Mr Andrew R. Page; Provost Hugh Ross; Sir Joshua Ross-Taylor; Mr Francis W. Walker; Mr Andrew Wilson; Mr James Wyllie. *Hon. Secretary*—Mr Alexander Murdoch.

Resignation of Treasurer.

A letter was read from the Earl of Home, K.T., expressing warm thanks for the kind message sent by the Directors from their last Meeting. Lord Home added that it had been a great privilege to meet and know so many good friends, and that he would always look back with great pleasure to his time as Treasurer of the Society.

Hill Sheep Subsidy.

A letter was read from the General Secretary of the National Farmers' Union and Chamber of Agriculture with regard to a forthcoming Joint Meeting to discuss the assessment of the amount of Hill Sheep Subsidy required for the current year. The Society was invited to nominate representatives who could attend a Meeting at relatively short notice.

It was agreed to appoint Mr J. W. Alexander, M.V.O., Langshaw, Moffat, and Captain James Craig, Gwydyr House, Comrie Road, Crieff, to represent the Society at the proposed Joint Meeting.

First Post-War Show at Inverness.

The following Report of the Special Committee was submitted by the Chairman of Directors :—

Since last Meeting of the Board on 6th November the Special Committee has continued its efforts to secure an allocation of timber for a Show at Inverness in 1947.

As mentioned in the Report to that Meeting, after making application to various Government Departments the Committee was advised that the proper procedure was to put up a special case to the Board of Trade, Raw Materials Department, Millbank, London. A letter was accordingly forwarded on 6th November to Mr A. W. Mackenzie, Raw Materials Department, Board of Trade.

In that letter it was first pointed out that the Society was the National Agricultural Society of Scotland. It was explained that it was the practice for the Society to hire the necessary timber for the Show, but that under present conditions no timber merchant was in a position to provide the quantity required, as the quotas allowed were wholly taken up for housing purposes.

It was pointed out that both the Minister of Agriculture and the Secretary of State for Scotland had expressed agreement that it was in the national interest that national Shows should be resumed. The Show of the Royal Agricultural Society of England would be held at Lincoln next year and the Show of the Royal Welsh Agricultural Society at Carmarthen. The Royal Ulster Society would also hold its Show at Belfast.

It was mentioned that the quantity of timber used at the last Show at Inverness in 1932 was 300 standards, but that every endeavour would be made to use substitute material, as far as possible, on this occasion. It was further emphasised that the timber was required only for the period of the Show, and, subject to a small percentage of waste, would be available after the Show for housing or other essential work.

As already reported to the Board, the Department of Agriculture had indicated, at a Meeting with members of the Committee on 5th November, that, subject to the approval of the Secretary of State for Scotland, they would strongly support the Society's application to the Board of Trade.

A copy of the letter to the Board of Trade was accordingly forwarded to the Department of Agriculture on 7th November with an urgent request that the Secretary of State should give his support to the Society's application.

On 11th November the Chairman called personally at the Board of Trade in London, to follow up the letter of 6th November, and had a long interview. He found that, unless the Society had the strong support of the Department of Agriculture, the position as regards new timber was hopeless, and a letter to that effect was received by the Secretary the following day.

On 18th November the following reply was received from the Department of Agriculture :—

" I refer to your letter of 7th November requesting support for your Society's application for an allocation of 300 standards of timber for use at the proposed Show at Inverness next June.

" As you are aware, this matter has been brought to the notice of the Secretary of State, and I have now to say that Mr Westwood feels that it would be quite incompatible with his responsibility as Housing Minister to seek to secure an allocation of timber to the Society on this scale, even taking into account that a large proportion of the timber would later be available, after use at the Show, for housing or other essential work.

" The Secretary of State regrets delay in the resumption of the Society's Show, and, if the Society could obtain the use of timber which is not suitable for any essential work, he would be happy to see the Show go on this year."

This reply was considered by the Special Committee at a Meeting on 25th November, when it was decided (a) to ask the Secretary of State to receive a deputation to discuss the matter, and (b) to ascertain in the meantime what was the smallest quantity of timber which would suffice for the Show, provided substitute material was used to the fullest extent.

As the result of a request to the Department of Agriculture a reply was received that the Secretary of State would be pleased to receive a deputation on Monday, 2nd December, at 12 noon, provided a Meeting of the Cabinet was not called for that day.

With regard to ascertaining the minimum quantity of timber which would suffice for the Show, the Committee decided, as a result of inquiries, that tubular scaffolding could be used for the Grandstand, and probably also for the ordinary Implement shedding and Machinery in Motion shedding. Part of the boundary fence (about one-third), where it did not also form the back wall of horse-boxes or other buildings, could be constructed of corrugated-iron sheets or wire-netting. The Committee also decided that all flooring of stands within the Showyard could be dispensed with. The saving of timber thus effected would, in the opinion of the Society's Showyard Erector, reduce the number of standards required from 300 to 170.

On 29th November the Department of Agriculture telephoned that the Secretary of State would be unable to meet the deputation on 2nd December on account of Cabinet business arranged for that day. Following on this intimation a request was made to the Department that the Secretary of State be informed that our estimate of timber required was now limited to 170 standards. The Society would be glad to know if this limitation would affect the decision not to support the Society's application.

Only that morning a telephone message was received from Sir Patrick Laird, Secretary of the Department of Agriculture, that the Secretary of State was very sorry that he could not see his way to alter his decision.

While giving particulars of the foregoing negotiations in detail, it may be mentioned that your Committee have also been conducting inquiries in other directions. Home timber merchants in the Inverness area have been communicated with, besides the leading timber merchants throughout the country, but all give the same reply that their quotas will not permit of any allocation for Show purposes. Inquiries have been directed towards the acquisition of army huts, but this does not appear to be a feasible proposition on account of the cost of dismantling, cleaning, and transporting to the Show site. At the same time it is not known what huts are available, or if their purchase would be sanctioned by the responsible authority. Further, we are informed if they were dismantled the resulting material would become "usable timber" in the sense of the Government regulations, and as such would immediately fall under the control of the Board of Trade, Timber Control.

As already indicated, inquiries have been made regarding tubular scaffolding and estimates obtained. While such scaffolding would probably be available, it would be most expensive.

Some consideration has also been given to the question of purchasing standing timber, but here again the problem arises of obtaining a licence for felling the trees, and thereafter permission to use the resulting timber, so that even if suitable timber were available it is unlikely that it could be manufactured in time for the Show.

The Chairman, in submitting the Report, said that the Committee had a Meeting that forenoon, and very reluctantly came to the conclusion that the only recommendation they could make to the Directors was that it was impossible, owing to the difficulties that had been encountered, to hold the Show at Inverness in 1947. He was very sorry to have to put that recommendation to the Board. It had been his desire all along that the Show should be held, and he had worked as hard as he could towards that end, but the difficulties were such as to make it impossible. He then moved approval of the Report, adding that the Committee's recommendation was a unanimous one.

Provost Hugh Ross, Inverness, who was welcomed to the Meeting and invited to speak by the Chairman, said the Town Council had asked him to be present at the Meeting to inform the Directors that the Council, as local authority, would do anything which the Directors thought proper in order to secure the granting of the permit for timber. After what had been reported by the Chairman he was afraid there was nothing they could do, but they would like to help them if they could by an approach to the Secretary of State.

The Chairman said he was afraid from what he knew that the Council's efforts would not be any more successful than those of the Committee. They hoped, however, that arrangements could be made for the Show in 1948.

After several members had expressed their views, the Chairman's motion, approving of the Committee's Report and recommendation, was unanimously agreed to.

Tuberculosis Eradication.

A Minute of Meeting of Science Committee, dated 4th December, was read and approved.

The Minute stated that the Committee had considered the letter from the Ministry of Agriculture and Fisheries and the accompanying Confidential Notes on Tuberculosis Eradication Schemes. The Committee were agreed, in principle, with the proposal that some scheme of tuberculosis eradication should be initiated, and they had remitted to the following Sub-Committee to consider the Notes in detail and to formulate observations regarding the various suggestions therein contained: Mr J. W. Alexander, M.V.O. (*Convener*), Mr James Durno, Mr William Hogg, Mr J. E. Kerr, Mr A. W. Montgomerie, O.B.E., Mr William Montgomery, Mr W. J. Reid, Captain Ian S. Robertson, Mr William D. Simpson, Captain R. J. Thomson, Mr James Wither; with the Chairman, Honorary Secretary, and Treasurer, *ex officio*.

Market for Barley.

Mr R. Scott Aiton, M.C., Legerwood, Earlstoun, called attention to the unsatisfactory state of the barley trade in many parts of Scotland. Farmers in the South-East of Scotland, he said, were ordered by the Executive Committees to plough a certain acreage. They did so, and now they found that their barley was unsaleable except at a very reduced price. They were promised an assured market, with a maximum price of 101s. per quarter, but, due to the arrangements of the Ministry of Food, they found it impossible to get more than 81s. per quarter. He understood that distillers in Scotland were informed by the Minister of Food that no further allocation of barley would be made to them for the purpose of distilling for many weeks to come. Brewers in Edinburgh at least, had already received the allocation to which they were entitled. The other outlet for the disposal of barley was to manufacturers of pot barley for human consumption. As, however, this product was "on points," the market was strictly limited. He was given to understand that the Minister of Food was now purchasing the best qualities of barley at a reduced price and was processing the barley and passing it on to dairymen for the purpose of feeding dairy cows. Farmers must thresh their barley now in order to get the straw for bedding their cattle. He found it was impossible to get more than the minimum price for a very good quality of barley.

Mr Andrew Wilson, Broombank, Nairn, pointed out that farmers in the North found themselves in a worse plight than those in the South. In the North country there were about 20,000 quarters of barley threshed and in bags. There was no market for it, and the quality of the grain was rapidly deteriorating. In addition, in the area from Sutherland to Aberdeen, there were 160,000 quarters still to thresh.

Mr George Grant of Glenfarclas said that distillers in the North of Scotland were anxious to get barley and would pay the maximum price for it. This was the season of the year for making whisky, and they should get an allocation immediately.

After further discussion it was decided that a letter be written to the Minister of Food directing attention to the unsatisfactory state of the barley market in Scotland due to the refusal of the Minister to sanction an allocation of barley to the distillers. Copies of the letter should be sent to the Secretary of State for Scotland and to all Scottish Members of Parliament.

Duthie Prize.

On the recommendation of Mr James Durno, Crichtie, Inverurie, it was decided that the regulations governing the award of the Duthie Prize should be as follows:—

For the best group of three animals entered in the Shorthorn Classes, either got by the same sire or from the same dam, or comprising a bull with two of his progeny, or a cow with two of her progeny. All the animals to be the property of the same exhibitor. "Extra Stock" eligible to compete.

Nomination of Treasurer.

A Minute of Meeting of Office-bearers' Committee, dated 4th December, was submitted and approved.

The Minute stated that the Committee had unanimously decided to recommend that Sir Joshua Ross-Taylor, Mungoswells, Duns, be nominated at the Annual General Meeting in January as Treasurer of the Society to fill the vacancy caused through the resignation of the Earl of Home, K.T.

Finance.

A Minute of Meeting of Finance Committee, dated 4th December, was submitted and approved.

The Minute dealt with the following matters:—

Scottish Agricultural Organisation Society Ltd.—It was recommended that the grant of £100 to the Scottish Agricultural Organisation Society Ltd. be renewed for the year 1947.

Second Clerk.—The Secretary had reported that Mr John Watt, Second Clerk to the Society, had intimated his resignation in view of his entering on a business career in Glasgow. Mr Watt had been a member of the staff since 1929. He was not a contributor to the Staff Superannuation Scheme. It was recommended that, on leaving the Service of the Society, Mr Watt be given an honorarium of £100.

MEETING OF DIRECTORS, 8TH JANUARY 1947.

Mr JAMES R. LUMSDEN of Arden, Dumbartonshire, in the Chair.

Present.—*Ordinary Directors*—Mr R. Scott Aiton; Mr William Allison; Captain James Craig; Mr James Durno; The Earl of Elgin and Kincardine, K.T.; Mr George Grant; Mr William Hogg; Mr James R. Lumsden; Mr J. C. Wallace Mann; Mr Ian C. Menzies, O.B.E.; Mr James Paton, C.B.E.; Mr William J. Reid; Captain Ian S. Robertson; Mr William D. Simpson; Mr Matthew Templeton; Mr Thomas A. Wedderspoon; Mr James Wither. *Extraordinary Directors*—Major A. D. Campbell; Sir Joshua Ross-Taylor; Mr Richard J. Singer, F.I.A.(Scot.); Mr Francis W. Walker; Mr Andrew Wilson.

The late Major Mark Sprot of Riddell.

Before proceeding with the business of the Meeting the Chairman said it was with deep regret that he had to refer to the death of a former member of that Board, Major Mark Sprot of Riddell. Major Sprot, he said, was a member of the Society for a period of forty years. He served for one term as an Ordinary Director, from 1921 to 1925, and on three occasions as an Extraordinary Director, 1926, 1927, and 1931.

His name would always be associated with the development of Agricultural Co-operation in Scotland, in the promotion of which he took a leading part. As President of the Scottish Agricultural Organisation Society for twenty-three years he devoted much of his time and energies to fostering interest in the co-operative movement amongst farmers, crofters, and smallholders.

As an extensive sheep-farmer he was well known and highly respected in the Border area. He took a prominent part in the public life of the County of Roxburgh, and filled with acceptance many high offices. In all these positions his zeal and integrity earned for him the esteem and regard of his associates. His death was a loss to the Border area and to Agriculture generally, which was deeply regretted by a wide circle of friends and agriculturists throughout the country.

A Minute of regret and sympathy was submitted and adopted, the members present upstanding, and the Secretary was instructed to forward a copy to the widow and family of the deceased.

Finance.

A Minute of Meeting of Finance Committee, dated 8th January, was read and approved.

The Minute stated that the Accounts for the year 1945-46, as prepared by the Society's Auditor, had been submitted and approved, and signed by two members of the Finance Committee and by the Auditor.

Scottish Agricultural Organisation Society, Ltd.

On the motion of the Chairman it was unanimously agreed to confirm the proposed grant of £100 to the Scottish Agricultural Organisation Society, Ltd., for the year 1947.

Hill Sheep Subsidy.

Captain James Craig, Gwydyr House, Crieff, reported that, along with Mr J. W. Alexander, M.V.O., Langshaw, Moffat, he had attended a meeting on 20th December called by the National Farmers' Union of Scotland to consider as to the amount of the Hill Sheep Subsidy for the past year. After full discussion of the costs and receipts they agreed to lay certain figures before the Department of Agriculture. Thereafter they met with representatives of the Department, when it was found that there was little difference between the figures they put forward and those which the Department's officials had compiled. Substantial agreement was reached, and he expected that the results of that meeting would be issued by the Department at an early date.

First Post-War Show.

The Chairman reported that Mr W. M'Nair Snadden, M.P. for West Perthshire, had written to the Secretary stating that he had been asked by the Scottish Unionist Members' Committee to get in touch with the Society in order to ascertain if anything could be done to assist the Directors in holding a Show in 1947. Arrangements had accordingly been made for a meeting of the Special Committee with Mr Snadden on 6th January. At that meeting a full discussion took place, as a result of which it was agreed that everything possible had already been done to enable a Show to be held, but that the Committee's efforts had failed owing to the Secretary of State not seeing his way to support the Society's application for even a much reduced quantity of timber. In view of this, the best that could be done was to take all possible steps to ensure that the Show would be held in 1948. In this Mr M'Nair Snadden promised all possible assistance.

A letter was read from Sir Patrick R. Laird, C.B., Secretary of the Department of Agriculture for Scotland, stating that Mr Westwood had asked him to express again his appreciation of the importance of the Highland Show in the agricultural interest and his regret that it was not possible this year to recommend the release of unused timber for the purpose of a Show in 1947. The Society could rest assured that the fullest consideration would be given to any request for timber for a Show in 1948, but the Directors would appreciate that the final decision would have to be taken by the departments concerned in the light of estimated resources and requirements for that year. Mr Westwood further suggested that it would be very desirable if, as an insurance against any further difficulties in this direction, the Society in the meantime continued to explore the possibilities of securing the use of timber which had already been used for other purposes, or to make alternative arrangements for the Show which would avoid any substantial demand on timber.

The Chairman said he could assure the Directors that the Committee were using every endeavour to find a supply of timber for the 1948 Show.

Market for Barley.

The Chairman reported that, as agreed upon at last meeting, a letter had been written to the Minister of Food directing attention to the unsatisfactory state of the barley market in Scotland, due to the refusal of the Minister to sanction an allocation of barley to the distillers. Copies of the letter had been sent to the Secretary of State for Scotland, to all Scottish Members of Parliament, and to Scottish Representative Peers. Many Members of Parliament had replied that they were prepared to do whatever they could in the matter.

A letter of reply received from the Minister of Food was read. In it Mr Strachey pointed out that the guaranteed market for barley provided by the Ministry of Food was at the minimum price, and no undertaking had been given that growers would be able to dispose of their produce at a price above the guaranteed minimum. In conclusion, Mr Strachey said he was sorry that the overall supply position made it impossible for him to agree at present to an allocation of barley for distilling, but he gave an assurance that if there was an improvement in the cereals position he would be willing and anxious to make barley available to the distilling industry, the importance of which was fully recognised.

Mr Francis W. Walker of Leys emphasised that the distillers wanted barley now, which was the most suitable season for distilling, and if they got it now they would be able to supply draff for feeding to animals during the winter. If the Minister did not grant the distillers permission to distil until the summer it was of little use to them, and it was of no use to the farmers, who would then have feeding-stuffs in the form of grass and other foods.

Some further discussion followed. In reply to a question, Mr George Grant of Glenferclas said it was very much better to distil whisky in winter than in summer. From May onwards draff was unsaleable, as dairy cows would not touch it after they got on to grass.

On the suggestion of the Chairman it was decided that the Secretary should reply to Mr Strachey's letter on the lines of what had been said.

Implement Spare Parts.

Mr Francis W. Walker directed attention to the difficulty experienced by many farmers throughout the country in getting spare parts for implements, especially those of American and Canadian make. He said that for over a year he had been trying to get spare parts for a Deering Binder. He had applied to the Agricultural Executive Committee and to the Department of Agriculture, but, so far, without success. He had one International tractor which had been laid up since July of last year and there seemed no prospect of getting spare parts for it. The result was that both the binder

and the tractor were out of service. He was only one of many who were waiting for spare parts.

The Secretary was instructed to write to the Department of Agriculture directing attention to this matter and urging that they take such steps as may appear to them to be appropriate to secure an improvement in the supply of spare parts.

Unit Values of Manures and Feeding-stuffs.

The Chairman said it was usual to hold a meeting of the Science Committee on the first Wednesday in February to prepare a Schedule of Prices of Fertilisers and Feeding-stuffs, as at that date, together with a Scale of Unit Values of Fertilisers. Last year representatives of the trade who were present at the meeting were asked if they considered a useful purpose was served by the issue of the Schedule. They were unanimously of opinion that it was very useful to have such a Schedule of Values. In the meantime, however, the Chairman pointed out, the Society had decided to dispense with the services of a Consulting Chemist.

Mr James Paton moved that the Society continue to issue the Schedule. The unit values given in it, he said, were of great service to the members and all those engaged in using artificial manures of any kind and for checking values.

The motion was agreed to.

Royal Scottish Agricultural Benevolent Institution.

Mr R. Scott Aiton, M.C., Chairman of the Royal Scottish Agricultural Benevolent Institution, directed attention to the Appeal being made by the Institution for contributions to a Special Jubilee Fund, which it was hoped might reach a total of £50,000. This sum was required to enable the Institution to increase all pensions from £20 to £25 per annum, and to ensure that no really deserving case was turned away.

Mr Scott Aiton suggested that many Directors who were successful in organising Free Gift Sales and other efforts during the war years on behalf of the Scottish Red Cross Agriculture Fund might see their way to organise a similar effort on behalf of the Benevolent Institution.

It was unanimously decided that a letter be addressed to all Directors of the Society, soliciting their sympathy and support to the Appeal.

MEETING OF DIRECTORS, 2ND APRIL 1947.

Mr JAMES R. LUMSDEN of Arden, Dumbartonshire, in the Chair.

Present.—Ordinary Directors—Mr R. Scott Aiton; Mr J. W. Alexander, M.V.O.; Mr William Allison; Captain James Craig; Mr Peter W. Crawford; Mr James Durno; Mr George Grant; Mr William Hogg; Mr James R. Lumsden; Mr J. C. Wallace Mann; Mr Ian C. Menzies, O.B.E.; Mr William Montgomery; Mr William J. Reid; Captain Ian S. Robertson; Mr William D. Simpson; Mr Matthew Templeton; Captain R. J. Thomson; Mr James Wither. *Extraordinary Directors*—Mr J. E. Kerr; Mr John Kerr; Captain R. Maclean; Mr Richard J. Singer, F.I.A.(Scot.). *Treasurer*—Sir Joshua Ross-Taylor. *Hon. Secretary*—Mr Alexander Murdoch.

Before proceeding with the business of the Meeting, the Chairman said that since last Meeting of the Board the Society had lost through death several highly esteemed members. It was with the deepest regret that he had to refer to the following:—

The late Earl of Leven and Melville, K.T.

The Earl of Leven and Melville joined the Society in 1920, and for the past six years was a Vice-President. In the County of Nairn, where the family estates were situated, he took a prominent part in public affairs and filled many high offices, including that of Lord-Lieutenant of the County. He served with distinction in the Armed Forces during the first World War. As a member of the House of Lords he took an active interest in all measures affecting the welfare of Scotland.

On account of the unavoidable delay in holding a Show at Inverness, His Lordship had not had the opportunity of taking an active part in the work of the Society. It was known, however, that he took a keen interest in Agriculture. In the administration of his estates he proved himself to be a popular landlord, and he was held in high regard by all his tenants. His death was a loss to the Society, and to the County of Nairn, which was deeply regretted.

The late Earl of Caithness, C.B.E.

The Earl of Caithness was a member of the Society for about twenty years, and filled with distinction the office of President in 1935, the year of the successful Show at Aberdeen.

Lord Caithness was Convener of Aberdeen County Council for nearly fifteen years, and served for a term as Chairman of the Scottish Association of County Councils. In public administration his work was recognised throughout Scotland. He was deeply interested in all matters affecting the welfare of the people. He played an important part in bringing about legislation with far-reaching effects in improving the lot of the farm worker.

In these, and in his many other activities, his sound judgment and clear vision, combined with kindness of manner, earned for him the respect and esteem of all with whom he was associated.

Those members of the Board who remembered the capable manner in which he filled the office of President in 1935 would join with those throughout the North-east of Scotland who mourned his loss.

The late Mr Phipps O. Turnbull, Dunbar.

Mr Phipps O. Turnbull was a member of the Society for over forty-eight years and served as a Director on the Board, with an interval of only two years, from 1916 to 1936.

During his period of office as a member of the Board he took an active part in the work of the Society. He was a member of all the Standing Committees and took a special interest in the work of the Implements and Machinery Committee, of which he was Convener from 1918 to 1924 and from 1930 to 1936. It was during his Convener-ship that a successful demonstration of new Tractors and Implements was held at Fordel, Dalkeith, in 1922.

After relinquishing farming, Mr Turnbull took up residence in his native town of Dunbar, where he entered the Town Council. His energy and capacity rapidly raised him to the office of Provost, a position which he had held for the past ten years.

Those members of the Board who knew Mr Turnbull would remember him for his sound common-sense and cheerful disposition. They recalled with gratitude the valuable services which he rendered to the Society.

The late Colonel Robert W. Walker, Aberdeen.

Colonel Robert W. Walker joined the Society in 1892, so that his membership extended over a period of fifty-five years. He was elected a Director in 1927 and served in that capacity, with a break of only one year, till 1938.

His herd of Aberdeen-Angus cattle at Mains of Portlethen, which was dispersed in 1935, was the oldest in the country. Animals from that herd won many honours at both local and national Shows. Colonel Walker acted for many years as the Secretary of the Shetland Pony Society.

He rendered valuable services to the Society as a Director. Within recent months he gave of his time and professional skill to assist in the selection of a suitable site for the next Show to be held at Aberdeen.

Colonel Walker was a well-known personality in the agricultural and business life of Aberdeen. He would long be remembered for his kindly and helpful disposition, which earned for him the regard and esteem of all his associates. His death was deeply mourned by a wide circle of friends.

The late Mr James Paton, C.B.E., Kirkness.

Mr James Paton's membership of the Society extended over a period of twenty-eight years, during the last twelve of which he was a member of the Board. He took an active part in the affairs of the Society and rendered valuable service as a Director. He was a member of all the Standing Committees, was Vice-Convener of the Shows Committee, and acted as Assistant Steward of Implements at several of the Annual Shows. He was keenly interested in agricultural education, and for several years was one of the Society's representatives on the National Agricultural and Dairy Examination Boards.

Mr Paton was generally recognised as one of the most outstanding farmers in Central Scotland, and recently was appointed Chairman of the Eastern Area Agricultural Executive Committee. He took a prominent part in the public life of the district, being a Deputy-Lieutenant of Kinross-shire and a Justice of the Peace for the County. He was a Governor of the Edinburgh and East of Scotland College of Agriculture and a former President of the Scottish Chamber of Agriculture. He was widely known as an arbiter and valuer in farm valuations.

In all these activities Mr Paton displayed those qualities of sound judgment and integrity which earned for him the highest respect and regard of all who knew him. His wise counsel and ready help were frequently sought and warmly appreciated. They gratefully acknowledged his valuable services to the Society, and they sincerely mourned the passing of one who so faithfully served with them as a member of the Board.

The late Dr R. Stewart MacDougall.

Dr R. Stewart MacDougall occupied the office of Consulting Entomologist to the Society from January 1898 till his resignation in March 1934—a period of thirty-six years. At the General Meeting in June 1934 the Earl of Home, President, on behalf of members of the Society, presented Dr MacDougall with a piece of Silver Plate in recognition of his valuable services as Consulting Entomologist.

In doing so, Lord Home said the gifts were given "in recognition of Dr MacDougall's valuable help to the members and to the whole farming community, and they were also a token of sincere affection for an old friend. His research and consequent knowledge, and dispersion of that knowledge, must have saved farmers from incalculable damage. They offered him the gifts as a token of their deep appreciation of, and gratitude for, his admirable services, so freely given for the benefit of those engaged in the oldest and most permanent of all industries."

Dr MacDougall held many important appointments, including that of Lecturer in Agricultural and Forest Zoology in the University of Edinburgh. He was a most successful and popular Lecturer and his teaching and research earned for him a world-wide reputation among Entomologists.

Dr MacDougall's services to Science brought him well-deserved academic and other honours. In 1934 the Society added his name to its select Roll of Honorary Members.

His kindly nature and charm of manner endeared him to a wide circle of friends, by whom he was held in the highest admiration and esteem. They mourned his loss, not only as a devoted servant of the Society, but as a distinguished exponent of Science in its practical application to Agriculture.

Appropriate Minutes of regret and sympathy were submitted and adopted in each case, the members present upstanding, and the Secretary was instructed to forward copies to the relatives of the deceased.

The late Mr Donald MacKelvie, Arran.

The Chairman also made sympathetic reference to the death of Mr Donald MacKelvie, New Lanark, Lamlash, Arran, who had been a member of the Society for over thirty years. Although not so closely identified with the work of the Society as those already mentioned, Mr MacKelvie, he said, held office as an Extraordinary Director in the year of the last Glasgow Show, 1934. He devoted many years of his life to the breeding of new varieties of potatoes and his achievements in this direction brought him many honours and gained for him a world-wide reputation. He was also a breeder and successful exhibitor of Highland Ponies at the Society's Annual Show.

It was decided that the Secretary be instructed to convey the sympathy of the Board to the relatives of the deceased.

Inspection of Growing Crops of Potatoes.

Mr William D. Simpson, Highfield, North Berwick, submitted a report on the proceedings at a Conference regarding the Scheme for the Inspection of Growing Crops of Potatoes, held at St Andrew's House on 23rd January. In doing so, Mr Simpson said that he had had the privilege for the past four years of attending these Conferences with the late Mr James Paton, and would like to say how much Mr Paton would be missed at these Meetings. His opinion was always eagerly sought by members of the trade and officials of the Department, and everything he had to say was carefully listened to. His place would not easily be filled.

In speaking to the report, Mr Simpson said that the season 1946 was a bad one for virus diseases of all kinds, and the Trade felt that there would not be enough certified seed to supply the demand. The Department of Agriculture had accordingly granted a sub-standard report for 11,000 acres. The Potato Trade asked that the sub-standard report should be continued for another year because they were afraid that there would be a lot of sub-standard crops this season. The Department undertook to refer the matter to the Ministry of Agriculture and Fisheries, who were mainly concerned.

A letter had now been received from the Department stating that the Ministry regarded the issue of sub-standard reports as an emergency measure for adoption only if found necessary at the end of the season, when the results of the inspections were known; they were not prepared at this stage to commit themselves to approving such a report for 1947 in respect of seed requirements for the Protected Area.

The Chairman expressed the thanks of the Meeting to Mr Simpson for his very full report.

Implement Spare Parts.

The Secretary reported that, as instructed at last Meeting, he had written to the Department of Agriculture with regard to the difficulty in obtaining spare parts for imported agricultural implements. In reply, the Department explained that the main causes of the shortage had been labour and transport troubles in the United States, which had affected shipments of all types of spare parts. The Ministry of Agriculture and Fisheries were in close touch with the situation, through their representative in Washington, and cases of difficulty referred to the Department were taken up through these channels, and in cases referred to them everything possible was done to expedite delivery.

Market for Barley.

The Secretary reported that he had written to the Minister of Food, as instructed at last Meeting, expressing the further views of the Directors regarding the market for barley in Scotland. In reply a letter, dated 6th February, had been received from the Ministry of Food, in which reference was made to the fact that Mr Strachey had been able to make an allocation of 50,000 tons of barley to the distillers. While this quantity, the letter stated, was no doubt less than the distillers would have wished, it would enable them to recommence distilling on a limited scale and should do much to relieve the difficulties which farmers in Scotland had been experiencing in selling their barley above the minimum price of 81s. per quarter. The letter added that some slight improvement in the general coarse grains position had enabled the Minister to make this allocation and to provide the additional outlet for home-produced barley.

Tuberculosis Eradication.

Mr J. W. Alexander, M.V.O., Langshaw, Moffat, and Mr William Hogg, Clackmae, Earlstoun, gave a verbal report regarding the Conference on Tuberculosis Eradication, held at St Andrew's House on 3rd March. Prior to the Conference a Sub-Committee appointed by the Science Committee had given careful consideration to the confidential Memorandum forwarded by the Ministry of Agriculture and Fisheries. The Society was represented at the Conference, the proceedings of which were meantime to be regarded as confidential, by Mr J. W. Alexander, M.V.O. (Convener), Mr William Hogg, Mr William Montgomery, Captain Ian S. Robertson, and Mr James Wither.

Investigation Regarding Food Supplies.

The Secretary reported that on 7th March a letter was received from the Royal Agricultural Society of England inviting the Society to appoint representatives to attend a Conference on 20th March with a view to a factual investigation of the present situation as regards food supplies. In addition to representatives of the Royal and the Highland, representatives were invited to attend from the Royal Welsh Agricultural Society and the Royal Ulster Agricultural Society. The letter stated it was thought the country would soon be faced with a serious shortage of food, and it was therefore desirable that everything possible should be done to impress upon all concerned, notably the urban population, the dangers ahead and to indicate clearly what British farmers could and should contribute to the relief of the situation.

The Chairman, who attended the Conference along with Sir Joshua Ross-Taylor, said the main purpose of the Conference had been to draw up facts with regard to Agricultural Policy, which would be placed before a further Meeting, to which members of the National Farmers' Unions of the four countries and the Farm Servants' Unions, as well as the Landowners' Organisations and the Agricultural Societies, would be called. It was thought that if agreement between all these bodies could be obtained the policy which was suggested at that Meeting would be helpful to the Government and would be the basis of future Agricultural Policy. Some of the points which were advocated had been to a certain extent granted already—for instance, the increased feeding-stuffs for pigs and poultry and restrictions on export of tractors and agricultural implements. The Meeting was strongly of the opinion that export should be stopped until home producers' demands were satisfied.

Sir Joshua Ross-Taylor said that the idea behind the calling of the Conference was not to discuss long-term policy, but to try to help the country to get over existing difficulties.

It was decided that the Society be represented at the further Conference, to be held on 9th April, by the Chairman of Directors.

Double Summer Time.

It was unanimously decided to protest, in the strongest possible terms, against the introduction of Double Summer Time, and the Secretary was instructed to transmit this protest to the Secretary of State for Home Affairs and the Secretary of State for Scotland. In doing so, it was to be pointed out that the Directors were convinced that the effect of Double Summer Time would be that less food would be produced on our farms during the current year. For this unfortunate result the Government must take full responsibility.

Farmers generally were willing to accept Single Summer Time during a reasonable period on account of the benefits it was believed to bestow on urban workers. Double Summer Time in summer, however, and Single Summer Time in winter were bitterly resented. The imposition of these was looked upon as implying complete disregard for the well-being and convenience of the farmer and agricultural worker.

Since the passing of the Summer Time Act, Agriculture had suffered grievous losses in livestock and crop potential through extraordinary severe weather conditions. It was suggested that the Government might yet see its way, in view of these exceptional circumstances, to agree to some modification of the Act, so as to cause less anxiety, expense, and inconvenience to the farmer and thus enable him to contribute more effectively to the food supply of the country.

Royal Scottish Agricultural Benevolent Institution.

An application was submitted from the Royal Scottish Agricultural Benevolent Institution for a grant in support of its Special Jubilee Fund.

On the recommendation of the Finance Committee it was decided that a grant of £250 be given.

Animal Diseases Research Association.

An application was submitted from the Animal Diseases Research Association for renewal of the grant of £200 for the current year.

On the recommendation of the Finance Committee it was agreed that the grant be renewed.

Glasgow Veterinary College.

An application from the Glasgow Veterinary College was submitted asking for a renewal of the grant of £150 for the current year.

On the recommendation of the Finance Committee it was agreed that the grant be renewed.

George Hobson Cup.

A letter was submitted from the Secretary of the Scottish Friesian Breeders' Club, Paisley, forwarding a Silver Cup, which was part of a testimonial to Mr George Hobson, the retiring Secretary of the British Friesian Cattle Society. Mr Hobson had desired that a part of the money raised by the Club should be utilised in providing a Silver Cup for competition at this Society's Show.

The suggested conditions of award were as follows: for the best two cows of the British Friesian breed, in milk or forward in calf, bred by exhibitor, each cow having an official lactation yield of not less than 1000 gallons of milk and 3·5 per cent butter fat in not more than 365 days.

It was unanimously agreed to accept the Cup under the conditions stated, and the Secretary was instructed to convey to the Scottish Friesian Breeders' Club and to Mr George Hobson the Society's cordial thanks for the handsome gift.

Honorary Member—The Earl of Home, K.T.

On the recommendation of the Office-bearers' Committee, it was unanimously decided that the Earl of Home, K.T., be elected an Honorary Member of the Society in recognition of his great services to the Society as a Director, and while filling the offices of President, Vice-President, and Treasurer.

Finance.

A Minute of Meeting of Finance Committee, dated 2nd April, was submitted and approved.

In addition to the grants to the Animal Diseases Research Association, the Glasgow Veterinary College and the Royal Scottish Agricultural Benevolent Institution, already referred to, the Committee recommended the following grants: *Edinburgh Highland Beal and Strathpey Society*, £75; *Glasgow and West of Scotland S.P.C.A.*, £10.

PROCEEDINGS AT GENERAL MEETINGS.

GENERAL MEETING, 5TH JUNE 1946.

THE EARL OF ELGIN AND KINCARDINE, K.T., C.M.G., Broomhall, Dunfermline, in the Chair.

The President.

The Secretary read a letter of apology for absence from the President, Lochiel.

Election of Members.

The Secretary submitted a list of 77 candidates for election to membership. These were balloted for and duly elected.

Election of Office-bearers.

Mr James R. Lumsden of Arden, Chairman of Directors, moved that the following be elected Office-bearers of the Society for the year 1946-47 :—

President.—Sir Donald W. Cameron of Lochiel, K.T., Achnacarry, Spean Bridge, Inverness-shire.

Vice-Presidents.—The Duke of Sutherland, K.T., P.C., Dunrobin Castle, Golspie; The Earl of Leven and Melville, K.T., Glenferness House, Nairn; The Lord Lovat, D.S.O., M.C., Beaufort Castle, Beaulieu; Major John Stirling of Fairburn, Muir-of-Ord, Ross-shire.

Ordinary Directors, 1943.—Mr William D. Simpson, Highfield, North Berwick; Mr Ian M. Campbell, Bal Blair, Invershin, Sutherland; The Earl of Elgin and Kincardine, K.T., C.M.G., Broomhall, Dunfermline; Mr A. W. Montgomerie, O.B.E., Westburn Farm, Cambuslang; Mr Alexander Forbes, Rettie, Banff; Mr R. Scott Aiton, M.C., Legerwood, Earlstoun; Captain James Craig, Gwydyr House, Comrie Road, Crieff; Mr James Wither, Awhirk, Stranraer.

1944.—Captain Ian S. Robertson, Linkwood, Elgin; Mr John Niven, Gloagburn, Tibbermore; Mr James Clark, Windlaw Farm, Carmunnock; Mr James Durno, Crichton, Inverurie; Mr Matthew Templeton, Goshen Bank, Kelso; Mr James Johnston, Dunmore Home Farm, Falkirk; Mr William Montgomery, Banks, Kirkcudbright; Mr William Allison, Almond Hill, Kirkcriston.

1945.—Mr Thomas A. Wedderspoon, Castleton, Eassie, Angus; Mr James Kilpatrick, Craigie Mains, Kilmarnock; Mr George Grant of Glenfarclas, Blacksboat; Captain R. J. Thomson, Kaimess, West Linton; Mr James M'Laren, Alton, Stirling; Mr Peter W. Crawford, Dryfeholm, Lockerbie; Mr Ian C. Menzies, O.B.E., Broomhills, Liberton, Edinburgh; Mr Ralph S. MacWilliam, Garguston, Muir-of-Ord, Ross-shire.

1946.—Mr Thomas Black, Balig, Doonfoot, Ayr; Mr William J. Reid, Fordhouse of Dun, Montrose; Mr William Hogg, Jun., Clackmae, Earlstoun; Mr James R. Lumsden of Arden, Dumbartonshire; Mr J. W. Alexander, M.V.O., Ingleswood, Moffat; Mr J. C. Wallace Mann, Carrington Barns, Gorebridge, Midlothian; The Baroness Burton, Dochfour, Inverness; Mr James Paton, Kirkness, Glenoraig.

Extraordinary Directors.—Mr Alexander Cormack, "Dunkyan," Killearn, by Glasgow; Mr William I. Elliot, Middleton, Stow, Midlothian; Mr J. Milne Henderson, 15 Merchiston Park, Edinburgh; Mr J. E. Kerr of Harviestoun, Dollar; Mr John Kerr, Yorkston, Gorebridge, Midlothian; Mr Andrew R. Page, Argyll Estates Office, Inveraray; Sir Joshua Ross-Taylor, Mungoswells, Duns; Mr Richard J. Singer, F.I.A. (Scot.), (Wallets' Marts, Ltd.), Castle-Douglas, Kirkcudbrightshire; Mr Francis W. Walker of Leys, Leys Castle, Inverness; Mr James Wyllie, Beaumont, Victoria Road, Dumfries.

Show Division Directors.—Mr D. M. Allan, Ballintomb, Grantown-on-Spey; Mr Alexander Calder, Shamrock Lea, Kirkwall; Mr James Cameron, Balnakyle, Munlochy; Major A. D. Campbell, Stanstill, Wick; Mr George J. Grant, Fulrossie, Dornoch, Sutherland; Mr Kenneth P. MacGillivray, Kirkton, Bunchrew, Inverness; Captain R. Maclean

of Drynie, North Kessock, by Inverness; Mr William R. Petrie, Wester Manbeen, Elgin; Provost Hugh Ross, Town House, Inverness; Mr Andrew Wilson, Broombank, Auldearn, Nairn.

Treasurer.—The Earl of Home, K.T., The Hirsell, Coldstream.

Honorary Secretary.—Mr Alexander Murdoch, East Hallside, Cambuslang.

Mr James Wither, Awhirk, Stranraer, seconded the motion, and the Office-bearers were duly elected.

Special Grants.

Mr Alexander Murdoch, East Hallside, Cambuslang, Honorary Secretary, moved approval of the following Special Grants, which were recommended by the Board of Directors:—

- (1) £200 for the current year, to the Animal Diseases Research Association.
- (2) £150 for the current year, to the Glasgow Veterinary College.
- (3) £75 for the current year, to the Edinburgh Highland Reel and Strathspey Society.
- (4) £10 to the Glasgow and West of Scotland Society for the Prevention of Cruelty to Animals.

Mr William D. Simpson, Highfield, North Berwick, seconded the motion, and the Special Grants were approved.

Agricultural Education.

Sir Joshua Ross-Taylor, Convener of the Education Committee, submitted a Report on the Fiftieth Examination for the National Diploma in Agriculture:—

It was again arranged to hold two Examinations in 1946—one at Edinburgh during April for Scottish and other students, and the other at Leeds in July for English and Welsh students.

At the Examination at Edinburgh, which was held from 3rd to 10th April, 122 candidates presented themselves. The majority of the candidates were from Scottish centres, along with others from Leeds University, the Harper Adams Agricultural College, the Midland Agricultural College, and other English centres. As a result of the Examination, 60 Diplomas were awarded.

Of the 122 candidates, 11 appeared for all subjects, and 9 of these obtained the Diploma. 71 had passed certain subjects previously, and were completing the Examination on this occasion, and, of these, 51 were successful in obtaining the Diploma. The names of the successful candidates would appear in the 'Transactions.'

The remaining 40 presented themselves for first groups of three, four, or five subjects, and, of these, 26 passed in the subjects for which they appeared, and were entitled to appear for the second group of subjects at a subsequent Examination.

Twenty-six candidates failed in either one, two, or three subjects, which, under the Regulations, they would be allowed to take again at a following Examination.

At the Examination to be held at Leeds in July, 310 candidates had applied for admission. That number, along with the 122 candidates who appeared at Edinburgh, made a total of 432 candidates for the year 1946. In 1945 the number who entered was 351, which was then a record entry for this Examination.

The Loveday Report.

Sir Joshua Ross-Taylor also reported that in January a Committee, under the Chairmanship of Dr T. Loveday, appointed by the Minister of Agriculture and Fisheries, had issued its Report on Higher Agricultural Education in England and Wales.

That Report, relating to Education in England, would not, in the ordinary way, have engaged the attention of the Society. In the Report, however, the Committee express the view that the National Diplomas have, at any rate in their present form, outlived their usefulness and have progressively lost their relevance to actual needs. In that condemnation were included the National Diploma in Agriculture and the National Diploma in Dairying.

Following on the publication of the Report, a Memorandum was prepared by the Society giving a brief history of the Diplomas and the arguments in favour of their continuance. Copies of the Memorandum were forwarded to the Royal Agricultural Society of England, the Ministry of Agriculture and Fisheries, the Secretary of State for Scotland, the members of the Loveday Committee, and other interested parties and also to the Press.

It was hoped that a Meeting of representatives of the Society and the Royal Agricultural Society of England with officials of the Ministry to discuss the matter would be arranged to take place towards the end of June.

National Diploma in Dairying.

Sir Joshua Ross-Taylor further reported that a Sub-Committee of the National Dairy Examination Board had been engaged in revising the Regulations and Syllabus for the Examination for the National Diploma in Dairying. The Sub-Committee had now submitted its recommendations, and these were being considered by the Society's Education Committee and the Examination Board.

The most important change proposed was that, instead of one Diploma as at present, there should be two Diplomas: (a) a National Diploma in Dairy Husbandry, and (b) a National Diploma in Dairy Technology.

Scottish Red Cross Agriculture Fund.

Major R. F. Brebner, C.B.E., The Leuchold, Dalmeny, a Vice-Chairman of the Fund, reported that the Fund had been closed finally on 16th April. As the General Committee of the Fund had not yet met, he was unable to submit a detailed Report on the sixth and concluding year of the Fund's activities. He could say, however, that in spite of the termination of the appeal last June, a substantial sum had been received during the year. The revenue received might be described as balances or remainders from previous efforts or derived from various enterprises which had been arranged before the notice of closure was intimated and which were proceeded with according to the original plans. Details of these contributions and the final Report of the Fund would be published shortly.

General.

Mr James R. Lumsden, Chairman of Directors, reported briefly on other matters which had engaged the attention of the Directors during the past six months.

James Kilpatrick Perpetual Trophy.—As the result of a movement inaugurated by the Glasgow Agricultural Society and the Clydesdale Horse Society, a Fund had been raised with the object of presenting a testimonial to Mr James Kilpatrick of Craigie Mains. A sum of over £800 had been subscribed, and at a function in Glasgow on 24th May a cheque for £800 and various gifts were presented to Mr Kilpatrick. Following upon the presentation, Mr Kilpatrick handed the cheque to the Society to be used in the purchase of a Perpetual Trophy for competition by Clydesdale Entire Horses at the Society's Annual Shows. The conditions attached to the competition would be similar to those in force for the Cawdor Cup for Males, except that the trophy would be perpetual and could not be won outright by any exhibitor.

The Manderston Challenge Cup.—The Directors had that day accepted the offer of a handsome Silver Cup presented by Major C. W. H. Baillie of Manderston, Duns. The Cup would be for competition in the Hunter Classes at the Annual Shows. The regulations governing the award of the Cup had not yet been adjusted.

Agricultural Exhibition in Glasgow.—Representatives of the Society attended a Meeting convened by the Lord Provost of Glasgow on 11th March, when it was decided to hold an Agricultural Exhibition in the Kelvin Hall, Glasgow. The object of the Exhibition was to interest the urban population in agriculture and to promote closer collaboration between agriculture and industry through the medium of practical demonstration and pictorial record. Arrangements for the Exhibition were proceeding satisfactorily. The date had been fixed for 16th to 26th October. The National Farmers' Union and Chamber of Agriculture of Scotland, the Breed Societies, the Scottish Milk Marketing Board, and other interested bodies were taking an active part in the arrangements. A Guarantee Fund had been formed, and the Society had agreed to guarantee a sum of £1000.

Inspection of Growing Crops of Potatoes.—On 24th January representatives of the Society attended a Conference at St Andrew's House regarding the Scheme for the Inspection of Growing Crops of Potatoes. In 1945 the Society's representatives had put forward proposals to ensure that no crops of potatoes would be eligible for Stock Seed Certificates if they had been subjected to severe roting before inspection. The representatives had reported that the Department proposed making the standard even more severe than they had suggested. It was therefore to be hoped that the crops resulting from the use of stock seed would prove to be of an even higher standard than had been the case in the past.

Licensing of Boars.—The Society had also been represented at a Meeting held at St Andrew's House on 31st January to consider the regulations and relative forms relating to the Licensing of Boars. The regulations and forms had been prepared very much on the lines adopted in connection with the Licensing of Bulls.

Post-war Wool Marketing.—At the invitation of the Scottish Agricultural Organisation Society, representatives of the Society attended a Conference in Edinburgh on 22nd February, when the recommendations contained in the Report of the Elliot Committee on the future marketing of wool grown in Great Britain were considered. At

the Conference there had been considerable discussion, and a small deputation had been appointed to interview the Government.

Consulting Chemist.—The Directors at their Meeting on 3rd April had decided, on the recommendation of the Science Committee, not to fill the vacancy in the office of Consulting Chemist caused by the death of the late Dr Tocher. That meant that it would no longer be possible for members of the Society to have samples of fertilisers, feeding-stuffs, &c., analysed at the special rates hitherto in force. The decision had been arrived at in view of the fact that most Local Authorities now retained the services of a public analyst. Further, the three Agricultural Colleges had each a scheme whereby analyses could be carried out in connection with their advisory services.

Attested Cattle at Shows.—At their Meeting earlier that day the Directors had decided that cattle entered at the Society's Shows must be from attested herds, licensed tuberculin-tested herds, or supervised herds, or must have passed a recognised tuberculin test within two weeks of the date of closing of entries for the Show.

Science.

Mr J. W. Alexander, M.V.O., Convener of the Science Committee, submitted a Report on the work done in the Chemical Department during the first five months of 1946. The substance of the Report appears on pp. 125 and 126 of this volume.

Vote of Thanks.

On the motion of Mr J. Milne Henderson, Edinburgh, a cordial vote of thanks was accorded to the Earl of Elgin and Kincardine, K.T., C.M.G., for presiding.

ANNIVERSARY GENERAL MEETING, 8TH JANUARY 1947.

The EARL OF ELGIN AND KINCARDINE, K.T., C.M.G., Broomhall, Dunfermline, in the Chair.

The President.

The Secretary read a letter of apology for absence from the President, Lochiel. In his letter, the President expressed the very great disappointment which they all felt in the Highlands about the further postponement of the Show at Inverness. They felt that the Secretary of State might have done a great deal more than he had done to help the Society, especially seeing that the English and Welsh National Shows were being held in 1947.

Election of Members.

The Secretary submitted a list of 52 candidates for election to membership. These were balloted for and duly elected.

Membership.

Mr James R. Lumsden of Arden, Dumbartonshire, Chairman of Directors, reported that the membership of the Society at the beginning of 1946 was 8001. During the year there were lost, through death, resignations, and other causes, 183 members. New members elected during the year numbered 116 (39 in January and 77 in June), thus making the total membership at that date 7934.

Of that number 6084 were Life Members and 1850 paid subscriptions annually—206 on the higher rate and 1644 on the lower. Thirty-three members of the Society, so far as was known, were still on service with H.M. Forces, and these, in accordance with the resolution of the Directors, would continue to receive the privileges of membership without payment of subscriptions.

Election of Treasurer.

Mr James R. Lumsden reported that in November a letter had been received from the Earl of Home, K.T., intimating his resignation of the office of Treasurer of the Society, an office which he had held since 1935.

In accepting Lord Home's resignation the Directors had placed on record their appreciation of the valuable services which he had rendered to the Society, and their sense of the high esteem and regard in which he had been held by every member of the Board.

Mr Lumsden then moved that, in accordance with the unanimous recommendation of the Board of Directors, Sir Joshua Ross-Taylor, Mungoswalls, Duns, be elected Treasurer of the Society to fill the vacancy.

The motion was unanimously agreed to.

Sir Joshua Ross-Taylor expressed his appreciation of the honour which the members had conferred upon him in appointing him Treasurer of the Society.

Finance.

Mr Ian C. Menzies, O.B.E., Broomhills, Liberton, submitted the Accounts of the Society for the year ended 30th November 1946.

The value of the Society's Capital Funds, he said, showed a substantial increase as compared with the previous year, due mainly to the market appreciations in British Government Securities and Railway Stocks. Unfortunately this increase did not mean an increase in revenue.

Receipts for the year from all sources amounted to £8742, 17s. 11d., being slightly in excess of the total for 1945. £1015, 8s. was received in respect of annual subscriptions and £1235, 17s. for life subscriptions.

Expenditure amounted to £8657, 17s. 7d. During the year under review the net expenditure on Educational Work amounted to £45, 3s. 8d.; on work in the Chemical and Veterinary Departments, £197, 13s. 8d.; on the Society's 'Transactions,' £962, 9s. 3d.; and in grants to Local Societies for 1945 and for awards for Long Service, £789, 9s. 4d.

Special grants were made during the year as follows: Animal Diseases Research Association, £200; Glasgow Veterinary College, £150; Royal Scottish Agricultural Benevolent Institution, £100; Scottish Agricultural Organisation Society, £100; Scottish Red Cross Agriculture Fund, £115, 17s. 11d.; other grants, £152, 2s.—a total of £817, 19s. 11d.

Mr Menzies then moved approval of the following special grants, which had been recommended by the Board of Directors:—

- (1) £100 to the Scottish Agricultural Organisation Society, Ltd., for the year 1947.
- (2) £10 to the Scottish Society for the Prevention of Cruelty to Animals.

Mr William D. Simpson, Highfield, North Berwick, seconded, and the Accounts were adopted and the special grants unanimously approved.

Argyll Naval Fund.

Mr James Wither, Awhirk, Stranraer, submitted a report on the Fund for the year ended 30th November 1946. The income from the Fund for the year amounted to £357, 12s. 7d., while the expenditure comprised grants of £60 each to four Naval Cadets—a total of £240.

One or two vacancies, he said, were still waiting to be filled, and if any member knew of any suitable candidate, full particulars could be obtained from the Secretary. The annual allowance to beneficiaries under the Fund was now £60.

First Post-War Show.

Mr James R. Lumsden submitted a report on the first post-war Show at Inverness.

Members of the Society, he said, would have seen from reports in the Press of meetings of the Board of Directors that the Directors had been compelled, most reluctantly, to abandon the idea of holding a Show at Inverness in 1947.

This decision had been forced upon the Board by the fact that, in spite of all their efforts, they had been unable to secure even a limited allocation of timber for the Show.

At one stage in the negotiations the prospects had appeared to be hopeful, for both the Minister of Agriculture and the Ministry of Works had expressed agreement that it was in the national interest that national Shows should be resumed. The Board of Trade, on the other hand, as the controlling body for all building materials, had made it clear that to secure the necessary timber would require the strong support of the Department of Agriculture for Scotland.

When, however, the Secretary of State for Scotland, as head of the Department of Agriculture, was approached, he had replied that he could not see his way to support the Society's application for timber. The Directors had immediately offered to curtail their application to approximately half their normal requirements, but the Secretary of State had replied that he regretted he could not alter his decision.

The Directors had all along realised that, on account of the great shortage of timber and the tremendous demand for housing purposes, the Board of Trade might refuse to

grant an allocation, even although it had been made clear that the timber would be available for housing and other essential purposes immediately after the Show. What, however, had caused them grave disappointment was the fact that the refusal had not come from the Board of Trade or the Timber Control, but from the Secretary of State for Scotland. They felt that as Minister of Agriculture for Scotland the Secretary of State might have given their application his support, and left it to the Board of Trade, if it had been absolutely necessary in the national interest, to turn down their request.

The Directors, Mr Lumsden concluded, were directing their efforts to ensure that a Show would be held in 1948.

Colonel G. Dalrymple of the Binns, Linlithgow, asked if it would not be possible to get in touch with some Scottish friends in Canada and ask them to obtain a supply of Canadian timber in exchange for stock which Scottish farmers could supply.

Mr Lumsden, in reply, said he was afraid that if timber could be procured in that way it would come under control immediately it came into this country, and they would not be allowed to use it. The proposal, however, was an interesting one, and while it was too late to be of any use for 1947, it was one that could be thoroughly explored before 1948.

Scottish Red Cross Agriculture Fund.

Mr James Paton, C.B.E., Kirkness, Glencreig, reported that at the General Meeting held on 5th June it had not been possible to submit the details of the Fund for the Sixth and Final Financial Year ended 16th April 1946, as the Annual Meeting of the Scottish Red Cross Agriculture Fund had not been held by that date. That Meeting had been held on 19th June 1946. The Fund had been finally closed on 16th April 1946. The total raised during the last year of the Fund was £13,542, 1s. 2d. The aggregate total for the six years during which the Fund was in operation was £776,067, 1s. 8d. Through the Fund, the Scottish Branch, British Red Cross Society, had benefited to the extent of £715,088, 8s. 10d., whilst the St Andrew's Ambulance Association had received payments amounting to £60,978, 12s. 10d. It was unnecessary, he said, to go into further details, as the final Report on the Fund had already been published and appears in the 1946 volume of 'Transactions.' Mr Paton added that the result of the Fund represented one of the most magnificent efforts ever undertaken by Scottish agriculture.

Grants to Local Societies.

Captain Ian S. Robertson, Linkwood, Elgin, reported that during 1946 many of the Local Agricultural Associations had revived their Annual Shows which had been in abeyance during the war years. A sum of £296 had been awarded in premiums and medals for competition at these shows. £195 had been awarded in respect of Horse-breeding Grants. In addition, special grants for Allotments and other competitions and grants to Women's Rural Institutes amounted to £75, 15s. 3d. Eighty-six Medals for Ploughing and twenty-two Medals for Hoeing had been awarded during the year, at a cost of £134, 0s. 8d.

The issue of Gold Medals for Long Service Awards had been suspended during the war. In June 1946 the Directors had decided, in view of the impossibility of obtaining gold except at a prohibitive price, to replace the Gold Medal with an attractive Silver Gilt Medal. Including the awards which had been in suspense since 1940, 53 Silver Gilt Medals had been awarded during the year, whilst 108 Silver Medals had been given for Long Service. The cost of Medals and Certificates for Long Service during the year was £441, 19s. 8d.

For the year 1947 the Directors had decided to offer the following awards: £12 each to twenty-seven Societies and three Silver Medals each to twenty Societies (in intermediate year) for Show premiums; £15 each to sixteen Horse Associations in respect of Stallions engaged; £3 each to five Societies in Orkney and Shetland for Show premiums; £10 each to ten Federations of Scottish Women's Rural Institutes for Exhibition prizes; £20 to the Northern Counties Arts and Crafts Society; £10, 10s. to the Shetland Flock Book Society for Show premiums; £15 and fifteen Silver Medals to the Scottish Allotments and Gardens Society for best allotments; £5 to one Society for premiums for Cottages and Gardens; the usual Long Service Certificates and Medals, and medals for Ploughing and Hoeing Competitions. The total estimated expenditure in 1947 under that head was £1434, 10s.

Education.

National Diploma in Agriculture.—Sir Joshua Ross-Taylor, Convener of the Education Committee, submitted the following report on the Examinations for the National Diploma in Agriculture held in 1946:—

Two Examinations had again been held—one at Edinburgh and one at Leeds. A full report on the Fiftieth Examination, held at Edinburgh in April, had been given at meetings held on 5th June last.

At the Fifty-first Examination, held at Leeds from 9th to 19th July, 294 candidates had appeared. As a result of the Examination 79 Diplomas had been awarded. Of the 294 candidates, 128 had passed certain subjects previously, and were completing the Examination on that occasion, and, of these, 76 had been successful in obtaining the Diploma; 10 had appeared for all subjects, and, of these, 3 had obtained the Diploma. The names of the successful candidates would appear in the next volume of the 'Transactions.'

The remaining 156 had presented themselves for first groups of three, four, or five subjects, and, of these, 78 had passed in the subjects for which they had appeared and were entitled to appear for the second group of subjects at a subsequent Examination.

The number of candidates forward for the Examination in 1946—124 at Edinburgh and 294 at Leeds, in all 418—constituted a record entry for the N.D.A. Examination.

With reference to the Examinations to be held in 1947, it might be added that two Examinations would again be held—the first at Edinburgh in April, and the second at Leeds in July.

National Diploma in Dairying.—Sir Joshua Ross-Taylor also submitted a report on the Examination for the National Diploma in Dairying, held in September 1946.

The Fifty-first Annual Examination for the National Diploma in Dairying took place during September at the Dairy School for Scotland, Auchincruive, Ayr, for Scottish students, and at the University of Reading for English and Welsh students.

At the Auchincruive Centre, 73 candidates had presented themselves—56 candidates had appeared for all subjects, 1 for Part II. subjects, and 16 candidates for re-examination in certain subjects in which they had previously failed. 31 candidates had obtained the Diploma.

At the Reading Centre, 88 candidates had presented themselves—68 taking the whole Examination, and 20 for re-examination in certain subjects in which they had failed previously. 42 candidates had obtained the Diploma at that Centre.

The names of the successful candidates would appear in the next volume of the 'Transactions.'

Of those candidates who had failed, 20 at Auchincruive and 22 at Reading had failed in not more than three subjects, and these would be permitted, after further study, to reappear at the next Examination for the subjects in which they had failed.

The Regulations for the new National Diploma in Dairy Husbandry (N.D.D.H.) and National Diploma in Dairy Technology (N.D.D.T.) had now been adjusted, and would appear in the Syllabus of the Examinations to be published shortly. The first examinations under the new Regulations would be held in September 1948.

Market for Barley.

Mr James R. Lumsden, Chairman of Directors, reported that at their Meeting on 4th December the Directors had decided to make representations to the Minister of Food with regard to the unsatisfactory state of the barley trade in many parts of Scotland. It had been pointed out that there were thousands of quarters of malting barley lying in bags for which there was no market, except at the minimum price. This barley was rapidly deteriorating in quality. Distillers would readily buy this barley at the maximum price, but had been informed by the Minister of Food that no further allocation of barley would be made to them for the purpose of distilling for many weeks to come.

In reply to these representations, Mr Strachey had pointed out that the guaranteed market for barley provided by the Ministry was at the minimum price, and that no undertaking had been given at any time that growers would be able to dispose of their produce at a price above the guaranteed minimum. He had expressed regret that the overall supply position made it impossible for him to agree to an allocation of barley for distilling, but he had given the assurance that if there was an improvement in the cereals position, he would be willing and anxious to make barley available to the distilling industry, the importance of which, he had stated, was fully recognised.

The Directors, at their Meeting that day, continued Mr Lumsden, did not consider that the Minister's reply was at all satisfactory and the Secretary had been instructed to write again to Mr Strachey pointing out the urgency of the matter.

Vote of Thanks.

On the motion of Mr R. Scott Aiton, M.C., Legerwood, Earlstoun, a cordial vote of thanks was accorded to the Earl of Elgin and Kincardine, K.T., C.M.G., for presiding.

APPENDIX

PREMIUM BOOK

OF

THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND 1947

CONTENTS.

	PAGE
GENERAL NOTICE	3
CONSTITUTION AND MANAGEMENT	3
STATEMENT OF PRIVILEGES OF MEMBERS	4
TERMS OF MEMBERSHIP, &C.	5
OFFICERS AND DIRECTORS FOR 1946-1947	6
COMMITTEES FOR 1946-1947	9
REPRESENTATIVES ON OTHER BODIES	13
MEETINGS	15
GENERAL SHOW	15
DATES OF EXAMINATIONS	16
NATIONAL DIPLOMA IN AGRICULTURE (N.D.A.), 1947	17
WINNERS OF DIPLOMA IN 1946	25
NATIONAL DIPLOMA IN DAIRYING (N.D.D.), 1947	29
WINNERS OF DIPLOMA IN 1946	37
NEW DIPLOMAS—REGULATIONS FOR	39
NATIONAL DIPLOMA IN DAIRY HUSBANDRY (N.D.D.H.), 1948	43
NATIONAL DIPLOMA IN DAIRY TECHNOLOGY (N.D.D.T.), 1948	47
CERTIFICATES IN FORESTRY	51
VETERINARY CERTIFICATES AND MEDALS	51
PRICES OF FERTILISERS AND FEEDING-STUFFS—SEASON 1947 (as at 5th February)	52
TABLE OF COMPENSATION VALUES FOR 1947	55
ENTOMOLOGICAL DEPARTMENT	58
BOTANICAL DEPARTMENT	59

PREMIUMS OFFERED.

GROUP I.—REPORTS.

GENERAL REGULATIONS	61
1. THE SCIENCE AND PRACTICE OF AGRICULTURE—FOR APPROVED REPORTS ON—	
1. Rural Economy abroad, susceptible of being introduced into Scotland	62
2. Other suitable subjects	62

PREMIUMS OFFERED (continued)—

2. ESTATE IMPROVEMENTS—FOR APPROVED REPORTS ON—	
1. General Improvement of Estates by Proprietors	62
2, 3, 4, 5, and 6. Reclamation of Waste Land and Improvement of Natural Pasture by Proprietors or Tenants	63
3. HIGHLAND INDUSTRIES—FOR APPROVED REPORTS ON—	
1. Best mode of treating Native Wool, &c.	63
4. MACHINERY—FOR APPROVED REPORTS	64
5. FORESTRY—FOR APPROVED REPORTS ON—	
1. Planting on deep Peat-bog	64

GROUP II.—DISTRICT GRANTS.

APPLICATIONS FOR GRANTS	65
CLASS	
1. LOCAL AGRICULTURAL SOCIETIES—Grants of £12 for Show Premiums for Horses, Cattle, Sheep, and Pigs.	65
2. HORSE ASSOCIATIONS—Grants of £15 in respect of Stallions engaged for Agricultural purposes	73
3. LOCAL AGRICULTURAL SOCIETIES—Grants of Silver Medals in aid of Premiums	76
4. SPECIAL GRANTS	77
5. FEDERATIONS OF SCOTTISH WOMEN'S RURAL INSTITUTES—Grants of £10 for Show or Exhibition Prizes	79

GROUP III.—COTTAGES AND GARDENS, &c.

CLASS	
6. LOCAL SOCIETIES, &c.—Grants of £3 for Premiums for Best-kept Cottages and Gardens	82
7. LOCAL SOCIETIES, &c.—Grants of Minor Silver Medals for Best- kept Cottages and Gardens, Garden Produce, Poultry, and Honey	83

GROUP IV.—PLOUGHING, HOEING, AND LONG FARM SERVICE.

1. MEDALS FOR PLOUGHING COMPETITIONS	85
2. MEDALS FOR HOEING COMPETITIONS	86
3. CERTIFICATES AND MEDALS FOR LONG FARM SERVICE	87
AWARDS IN 1946	88

Address for communications:

JOHN STIRTON, O.B.E., Secretary,
The Highland and Agricultural Society of Scotland,
8 Eglinton Crescent,
Edinburgh 12.

GENERAL NOTICE.

THE HIGHLAND SOCIETY was instituted in the year 1784, and incorporated by Royal Charter in 1787. Its operation was at first limited to matters connected with the improvement of the Highlands of Scotland; but the supervision of certain departments, proper to that part of the country, having been subsequently committed to special Boards of Management, several of the earlier objects contemplated by the Society were abandoned, while the progress of agriculture led to the adoption of others of a more general character. The exertions of the Society were thus early extended to the whole of Scotland, and have since been continually directed to the promotion of the science and practice of agriculture in all its branches.

In accordance with this more enlarged sphere of action, the original title of the Society was altered, under a Royal Charter, in 1834, to THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND.

The Society avoids questions of political controversy, but in other public matters of practical concern to agriculture it seeks to guard and promote, by every means in its power, the welfare of all interested in the agriculture of Scotland.

Among the more important measures which have been effected by the Society are—

1. Agricultural Meetings and General Shows of Stock, Implements, &c., held in the principal towns of Scotland, at which exhibitors from all parts of Great Britain, Northern Ireland, and Eire (Irish Free State) are allowed to compete.
2. A system of District Shows instituted for the purpose of improving the breeds of Stock most suitable for different parts of the country, and of aiding and directing the efforts of Local Agricultural Societies and Associations.
3. A scheme of Awards to Farm Workers for long and approved service in Scotland.
4. The encouragement of Agricultural Education, under powers conferred by a supplementary Royal Charter, granted in 1856, and authorising the Society to grant Diplomas to Students of Agriculture; and by giving grants in aid of education in Agriculture and allied sciences. In 1800 the Society discontinued its own Examination, and instituted jointly with the Royal Agricultural Society of England an Examination for a National Diploma in Agriculture.
5. The institution of an Examination for a National Diploma in Dairying, jointly with the Royal Agricultural Society of England and the British Dairy Farmers' Association.
6. The institution of an Examination in Forestry for First and Second Class Certificates. Terminated in 1935 in accordance with arrangements made with the Royal Scottish Forestry Society.
7. The advancement of the Veterinary Art, by conferring Certificates on Students who have passed through a prescribed curriculum, and who are found, by public examination, qualified to practise. Terminated in 1881 in accordance with arrangements made with the Royal College of Veterinary Surgeons.
8. The establishment of a Botanical Department.
9. The appointment of an Entomologist to advise members regarding insect pests, &c.
10. The annual publication of the 'Transactions,' comprehending papers by selected writers, Prize Reports, and reports of experiments, also an abstract of the business at Board and General Meetings, and other communications.
11. The management of a fund left by John, 5th Duke of Argyll (the original President of the Society), to assist young natives of the Highlands who enter His Majesty's Navy.

CONSTITUTION AND MANAGEMENT.

The general business of THE HIGHLAND AND AGRICULTURAL SOCIETY OF SCOTLAND is conducted under the sanction and control of the Royal Charters, referred to above, which authorise the enactment of Bye-Laws.

The Office-Bearers consist of a President, Four Vice-Presidents, Thirty-two Ordinary and Twenty Extraordinary Directors, a Treasurer, an Honorary and an Acting Secretary, an Auditor, and other Officers.

The Supplementary Charter of 1856 provides for the appointment of a Council on Education, consisting of Sixteen Members—Nine nominated by the Charter and Seven elected by the Society.

STATEMENT OF PRIVILEGES OF MEMBERS.

MEMBERS OF THE SOCIETY ARE ENTITLED —

1. *To receive a free copy of the 'Transactions' annually.*
2. *To apply for District Premiums that may be offered, and for Long Service Awards for Agricultural Employees.*
3. *To report Ploughing Matches for Medals that may be offered.*
4. *To Free Admission to the Shows of the Society.*
5. *To exhibit Live Stock and Implements at reduced rates.*

Firms are not admitted as Members; but if one partner of a firm becomes a Member the firm is allowed to exhibit at Members' rates.

6. *To obtain Reports on the Animal Enemies of Crop Plants and Live Stock (including Poultry).*
7. *To attend and vote at General Meetings of the Society.*
8. *To vote for the Election of Directors.*
&c., &c.

REPORTS ON THE ANIMAL ENEMIES OF CROP PLANTS AND LIVE STOCK (INCLUDING POULTRY).

The Consulting Zoologist is prepared to send to any Member of the Society a Report on damage to, or diseases of, plants and animals due to animal agency (Insects, Mites, Worms, Snails, Slugs, Birds, and the Smaller Mammals).

For further particulars, see under Entomological Department.

Consulting Zoologist.—Mr A. E. CAMERON, M.A., D.Sc., Department of Agricultural and Forest Zoology, University of Edinburgh, 10 George Square, Edinburgh.

TERMS OF MEMBERSHIP, &c.

The influence and usefulness of the Society depend mainly upon its strength in membership. The Members, through the Directors whom they elect, have the practical control of the affairs of the Society. The stronger the body of Members, the greater will be the usefulness of the Society. It will therefore be to both their own and the public advantage if all who are interested in agriculture, and who are not already enrolled, should at once become Members of the Society.

ELECTION OF MEMBERS.

Candidates for admission to the Society must be proposed by a Member, and are elected at the half-yearly General Meetings in January and June. It is not necessary that the proposer should attend the Meeting.

RATES OF SUBSCRIPTION.

HIGHER SUBSCRIPTION.

The ordinary annual subscription is £1, 3s. 6d., and the ordinary subscription for life-membership is £12, 12s.; or after ten annual payments have been made, £7, 7s.

LOWER SUBSCRIPTION.

Proprietors farming the whole of their own lands, whose rental on the Valuation Roll does not exceed £500 per annum, and all Tenant-Farmers, Secretaries or Treasurers of Local Agricultural Associations, Factors resident on Estates, Land Stewards, Foresters, Agricultural Implement Makers, Grain, Seed and Manure Merchants, Agricultural Auctioneers, Cattle Dealers and Veterinary Surgeons, none of them being also owners of land to an extent exceeding £500 per annum, and such other persons as, in respect of their official or other connection with agriculture, the Board of Directors may consider eligible, are admitted on a subscription of 10s. annually, which may be redeemed by one payment of £7, 7s., and after eight annual payments of 10s. have been made, a Life Subscription may be purchased for £5, 5s., and after twelve such payments, for £3, 3s.

It must be stated, on behalf of Candidates claiming to be admitted at the Lower Rate of Subscription (10s.), under which of the above designations they are entitled to be admitted at the Lower Rate.

Subscriptions are payable on election, and afterwards annually in January.

According to the Charter, a Member who shall not have objected to his election, on the same being intimated to him by the Secretary, cannot retire until he has paid, in annual subscriptions or otherwise, an amount equivalent to a life composition.

Members are requested to send to the Secretary the names and addresses of Candidates proposed for admission to the Society, at the same time stating whether the Candidates should be admitted at the £1, 3s. 6d. or 10s. rate.

Patron of the Society.—HIS MAJESTY THE KING.

OFFICERS AND DIRECTORS FOR 1946-1947.

President.

Sir DONALD W. CAMERON OF LOCHIEL, K.T., Achnacarry, Spean Bridge,
Inverness-shire.

Vice-Presidents.

The DUKE OF SUTHERLAND, K.T., P.C., Dunrobin Castle, Golspie.
The EARL OF LEVEN AND MELVILLE, K.T., Glenferness House, Nairn.
LORD LOVAT, D.S.O., M.C., Beaufort Castle, Beaulieu.
Major JOHN STIRLING of Fairburn, Muir-of-Ord, Ross-shire.

Year of
Election.

Ordinary Directors.

1943	WILLIAM D. SIMPSON, Highfield, North Berwick.
	IAN M. CAMPBELL, Bal Blair, Invershin, Sutherland.
	The EARL OF ELGIN AND KINCARDINE, K.T., C.M.G., Broom- hall, Dunfermline.
	A. W. MONTGOMERIE, O.B.E., Westburn Farm, Cambuslang.
	ALEXANDER FORBES, Rettie, Banff.
1944	R. SCOTT AITON, M.C., Legerwood, Earlston.
	Captain JAMES CRAIG, Gwydyr House, Comrie Road, Crieff.
	JAMES WITHER, Awhirk, Stranraer.
	Captain IAN S. ROBERTSON, Linkwood, Elgin.
	JOHN NIVEN, Gloagburn, Tibbermore.
1945	JAMES CLARK, Windlaw Farm, Carmunnock.
	JAMES DURNO, Crichtie, Inverurie.
	MATTHEW TEMPLETON, Goshen Bank, Kelso.
	JAMES JOHNSTON, Dunmore Home Farm, Falkirk.
	WILLIAM MONTGOMERY, Banks, Kirkcudbright.
1946	WILLIAM ALLISON, Almond Hill, Kirkliston.
	THOMAS A. WEDDERSPOON, Castleton, Eassie, Angus.
	JAMES KILPATRICK, Craigie Mains, Kilmarnock.
	GEORGE GRANT of Glenfarclas, Blacksboat.
	Captain R. J. THOMSON, Kaimies, West Linton.
1946	JAMES M'LAREN, Alton, Stirling.
	PETER W. CRAWFORD, Dryfeholm, Lockerbie.
	IAN C. MENZIES, O.B.E., Broomhills, Liberton, Edinburgh.
	RALPH S. MACWILLIAM, Garguston, Muir-of-Ord, Ross-shire.
	THOMAS BLACK, Balig, Doonfoot, Ayr.
1946	WILLIAM J. REID, Fordhouse of Dun, Montrose.
	WILLIAM HOGG, Clackmae, Earlston.
	JAMES R. LUMSDEN of Arden, Dumbartonshire.
	J. W. ALEXANDER, M.V.O., Langshaw, Moffat.
	J. C. WALLACE MANN, Carrington Barns, Gorebridge, Mid- lothian.
1946	THE BARONESS BURTON, Dochfour, Inverness.
	JAMES PATON, C.B.E., Kirkness, Glencraig.

Year of
Election

Extraordinary Directors.

- | | | |
|------|---|--|
| 1945 | { | ALEXANDER CORMACK, Dunkyan, Killearn, by Glasgow. |
| | | WILLIAM I. ELLIOT, Middleton, Stow, Midlothian. |
| | | JOHN KERR, Yorkston, Gorebridge, Midlothian. |
| | | ANDREW R. PAGE, Argyll Estates Office, Inveraray. |
| 1946 | { | RICHARD J. SINGER, F I A (Scot), Wallets' Marts, Ltd.,
Castle Douglas, Kirkcudbrightshire |
| | | JAMES WYLLIE, Beaumont, Victoria Road, Dumfries. |
| | | J E KERR of Harviestoun, Dollar |
| | | FRANCIS W. WALKER of Leys, Leys Castle, Inverness. |

Stow Division Directors.

D. M. ALLAN, Ballintomb, Grantown-on-Spey.
 ALEXANDER CALDER, Shamrock Lea, Kirkwall.
 JAMES CAMERON, Balnakyle, Munlochry.
 Major A. D. CAMPBELL, Stanstill, Wick
 GEORGE J. GRANT, Pulrossie, Dornoch
 KENNETH P. MACGILLIVRAY, Kirkton, Bunchrew, Inverness.
 Captain R. MACLEAN of Drynie, North Kessock, by Inverness.
 WILLIAM PETRIE, Wester Manbeen, Elgin
 Provost HUGH ROSS, Town House, Inverness
 ANDREW WILSON, Broombank, Auldearn, Nairn.

Chief Officials, &c.

SIR JOSHUA ROSS-TAYLOR, Mungoswalls, Duns, *Treasurer*.
 ALEXANDER MURDOCH, East Hallside, Cambuslang, *Honorary Secretary*.
 JOHN STIRTON, O B E., 8 Eglinton Crescent, Edinburgh, *Secretary*.
 THOMAS W. RUSSELL, *Chief Clerk*
Second Clerk.
 GEORGE JAMES GREGOR, C A , 8 York Place, Edinburgh, *Auditor*.
Master of Works.
 A E CAMERON, M A , D Sc , University of Edinburgh, 10 George Square,
 Edinburgh, *Consulting Zoologist*
 The Very Rev. CHARLES L. WARR, D D , 63 Northumberland Street,
 Edinburgh, *Chaplain*
 TODS, MURRAY & JAMIESON, W S , 66 Queen Street, Edinburgh, *Law Agents*
 WILLIAM BLACKWOOD & SONS LTD , 45 George Street, Edinburgh,
Publishers
 HAMILTON & INCHES, Princes Street, Edinburgh, *Silversmiths*
 ALEXANDER KIRKWOOD & SON, 9 St James' Square, Edinburgh, *Medallists*.
 JOHN MENZIES & Co LTD , 6 Castle Street, Edinburgh, *Advertising Agents*.
 FRANK REID, 55 Blenheim Place, Aberdeen, *Showyard Erector*.
 J. P. LAUDER, *Officer and Caretaker*.

Chairman of Board of Directors.

JAMES R. LUMSDEN of Arden, Dumbartonshire,

Chairmen of Committees.

1. *Argyll Naval Fund* . . . JAMES R. LUMSDEN of Arden, Dum-
bartonshire.
2. *Finance, Chambers, and Law* Sir JOSHUA ROSS-TAYLOR, Mungoswalls,
Duns.
3. *Publications* . . . JAMES R. LUMSDEN of Arden, Dum-
bartonshire.
4. *Shows* . . . Captain IAN S. ROBERTSON, Linkwood,
Elgin.
5. *Implements and Machinery* . Sir JOSHUA ROSS-TAYLOR, Mungoswalls,
Duns.
6. *Science* . . . J. W. ALEXANDER, M.V.O., Langshaw,
Moffat.
7. *General Purposes* . . . JAMES R. LUMSDEN of Arden, Dum-
bartonshire.
8. *Education* . . . Sir JOSHUA ROSS-TAYLOR, Mungoswalls,
Duns.
9. *Office-bearers* . . . JAMES R. LUMSDEN of Arden, Dum-
bartonshire.

COMMITTEES FOR 1946-1947.

1. ARGYLL NAVAL FUND.

JAMES R. LUMSDEN of Arden, Dumbartonshire, *Convener*.
 Major R. F. BREBNER, C.B.E., The Leuchold, Dalmeny House, Edinburgh.
 Sir GEORGE I. CAMPBELL of Succoth, Bt., Crarae Lodge, Minard, Argyll.
 IAN M. CAMPBELL, Bal Blair, Invershin.
 Captain JAMES CRAIG, Gwydyr House, Comrie Road, Crieff.
 JAMES DURNO, Crichtie, Inverurie.
 The EARL OF ELGIN AND KINCARDINE, K.T., C.M.G., Broomhall, Dunfermline.
 The EARL OF HOME, K.T., The Hirsell, Coldstream.
 J. E. KERR of Harviestoun, Dollar.
 ALEXANDER MURDOCH, East Hallside, Cambuslang.
 ANDREW R. PAGE, Argyll Estates Office, Inveraray.
 Sir JOSHUA ROSS-TAYLOR, Mungoswalls, Duns.

2. FINANCE, CHAMBERS, AND LAW.

Sir JOSHUA ROSS-TAYLOR, Mungoswalls, Duns, Treasurer, *Convener*.
 J. W. ALEXANDER, M.V.O., Langshaw, Moffat.
 JAMES DURNO, Crichtie, Inverurie.
 GEORGE GRANT of Glenfarclas, Blacksboat.
 J. E. KERR of Harviestoun, Dollar.
 JAMES KILPATRICK, Craigie Mains, Kilmarnock.
 JAMES R. LUMSDEN of Arden, Dumbartonshire.
 IAN C. MENZIES, O.B.E., Broomhills, Liberton, Edinburgh.
 ALEXANDER MURDOCH, East Hallside, Cambuslang.
 JAMES PATON, C.B.E., Kirkness, Glencaig.
 Captain IAN S. ROBERTSON, Linkwood, Elgin.
 FRANCIS W. WALKER of Leys, Leys Castle, Inverness.
 GEORGE JAMES GREGOR, C.A., Auditor, *ex officio*.

3. PUBLICATIONS.

JAMES R. LUMSDEN of Arden, Dumbartonshire, *Convener*.
 R. SCOTT AITON, M.C., Legerwood, Earlston.
 J. W. ALEXANDER, M.V.O., Langshaw, Moffat.
 THOMAS BLACK, Balig, Doonfoot, Ayr.
 JAMES DURNO, Crichtie, Inverurie.
 The EARL OF ELGIN AND KINCARDINE, K.T., C.M.G., Broomhall, Dunfermline.
 GEORGE GRANT of Glenfarclas, Blacksboat.
 J. E. KERR of Harviestoun, Dollar.
 A. W. MONTGOMERIE, O.B.E., Westburn Farm, Cambuslang.

WILLIAM MONTGOMERY, Banks, Kirkcudbright.
 ALEXANDER MURDOCH, East Hallside, Cambuslang.
 JAMES PATON, C.B.E., Kirkness, Glencraig.
 Captain IAN S. ROBERTSON, Linkwood, Elgin.
 Sir JOSHUA ROSS-TAYLOR, Mungoswalls, Duns.
 Captain R. J. THOMSON, Kaimes, West Linton.

4. SHOWS.

Captain IAN S. ROBERTSON, Linkwood, Elgin, *Convener*.
 JAMES PATON, C.B.E., Kirkness, Glencraig, *Vice-Convener*.
 R. SCOTT AITON, M.C., Legerwood, Earlston.
 J. W. ALEXANDER, M.V.O., Langshaw, Moffat.
 D. M. ALLAN, Ballintomb, Grantown-on-Spey.
 WILLIAM ALLISON, Almond Hill, Kirkliston.
 THOMAS BLACK, Balig, Doonfoot, Ayr.
 THE BARONESS BURTON, Dochfour, Inverness.
 ALEXANDER CALDER, Shamrock Lea, Kirkwall.
 JAMES CAMERON, Balnakyle, Munloch.
 Major A. D. CAMPBELL, Stanstill, Wick.
 IAN M. CAMPBELL, Bal Blair, Invershin.
 JAMES CLARK, Windlaw Farm, Carmunnock.
 ALEXANDER CORMACK, Dunkyan, Killearn, by Glasgow.
 Captain JAMES CRAIG, Gwydyr House, Comrie Road, Crieff.
 PETER W. CRAWFORD, Dryfeholm, Lockerbie.
 JAMES DURNO, Crichtie, Inverurie.
 The EARL OF ELGIN AND KINCARDINE, K.T., C.M.G., Broomhall, Dunfermline.
 WILLIAM I. ELLIOT, Middletoun, Stow, Midlothian.
 ALEXANDER FORBES, Rettie, Banff.
 GEORGE GRANT of Glenfarclas, Blacksboat.
 GEORGE J. GRANT, Pulrossie, Dornoch.
 WILLIAM HOGG, Clackmae, Earlston.
 JAMES JOHNSTON, Dunmore Home Farm, Falkirk.
 J. E. KERR of Harviestoun, Dollar.
 JOHN KERR, Yorkston, Gorebridge, Midlothian.
 JAMES KILPATRICK, Craigie Mains, Kilmarnock.
 JAMES R. LUMSDEN of Arden, Dumbartonshire.
 KENNETH P. MACGILLIVRAY, Kirkton, Bunchrew, Inverness.
 JAMES M'LAREN, Alton, Stirling.
 Captain R. MACLEAN of Drynie, North Kessock, by Inverness.
 RALPH S. MACWILLIAM, Garguston, Muir-of-Ord, Ross-shire.
 J. C. WALLACE MANN, Carrington Barns, Gorebridge.
 IAN C. MENZIES, O.B.E., Broomhills, Liberton, Edinburgh.
 A. W. MONTGOMERIE, O.B.E., Westburn Farm, Cambuslang.
 WILLIAM MONTGOMERY, Banks, Kirkcudbright.
 ALEXANDER MURDOCH, East Hallside, Cambuslang.
 JOHN NIVEN, Gloagburn, Tibbermore.
 ANDREW R. PAGE, Argyll Estates Offices, Inveraray.
 WILLIAM PETRIE, Wester Manbeen, Elgin.
 WILLIAM J. REID, Fordhouse of Dun, Montrose.
 Provost HUGH ROSS, Town House, Inverness.
 Sir JOSHUA ROSS-TAYLOR, Mungoswalls, Duns.
 WILLIAM D. SIMPSON, Highfield, North Berwick.
 RICHARD J. SINGER, F.I.A.(Scot.), Wallets' Marts, Ltd., Castle Douglas,

MATTHEW TEMPLETON, Goshen Bank, Kelso.
 Captain R. J. THOMSON, Kaimies, West Linton.
 FRANCIS W. WALKER of Leys, Leys Castle, Inverness.
 THOMAS A. WEDDERSPOON, Castleton, Eassie, Angus.
 ANDREW WILSON, Broombank, Auldearn, Nairn.
 JAMES WITHER, Awhirk, Stranraer.
 JAMES WYLLIE, Beaumont, Victoria Road, Dumfries.

5. IMPLEMENTS AND MACHINERY.

Sir JOSHUA ROSS-TAYLOR, Mungoswalls, Duns, *Convener*.
 JAMES PATON, C.B.E., Kirkness, Glencraig, *Vice-Convener*.
 R. SCOTT AITON, M.C., Legerwood, Earlston.
 J. W. ALEXANDER, M.V.O., Langshaw, Moffat.
 WILLIAM ALLISON, Almond Hill, Kirkliston.
 THOMAS BLACK, Balig, Doonfoot, Ayr.
 ALEXANDER CORMACK, Dunkyan, Killearn, by Glasgow.
 PETER W. CRAWFORD, Dryfeholm, Lockerbie.
 JAMES DURNO, Crichtie, Inverurie.
 ALEXANDER FORBES, Rettie, Banff.
 J. E. KERR of Harviestoun, Dollar.
 JOHN KERR, Yorkston, Gorebridge, Midlothian.
 JAMES M'LAREN, Alton, Stirling.
 J. C. WALLACE MANN, Carrington Barns, Gorebridge.
 IAN C. MENZIES, O.B.E., Broomhills, Liberton, Edinburgh.
 A. W. MONTGOMERIE, O.B.E., Westburn Farm, Cambuslang.
 WILLIAM MONTGOMERY, Banks, Kirkcudbright.
 ALEXANDER MURDOCH, East Hallside, Cambuslang.
 JOHN NIVEN, Gloagburn, Tibbermore.
 Captain IAN S. ROBERTSON, Linkwood, Elgin.
 WILLIAM D. SIMPSON, Highfield, North Berwick.
 FRANCIS W. WALKER of Leys, Leys Castle, Inverness.
 THOMAS A. WEDDERSPOON, Castleton, Eassie, Angus.
 JAMES WITHER, Awhirk, Stranraer.
 JAMES WYLLIE, Beaumont, Victoria Road, Dumfries.
 JAMES R. LUMSDEN of Arden, Dumbartonshire, Chairman of Board of Directors, *ex officio*.

6. SCIENCE.

J. W. ALEXANDER, M.V.O., Langshaw, Moffat, *Convener*.
 R. SCOTT AITON, M.C., Legerwood, Earlston, *Vice-Convener*.
 THOMAS BLACK, Balig, Doonfoot, Ayr.
 JAMES CLARK, Windlaw Farm, Carmunnock.
 Captain JAMES CRAIG, Gwydyr House, Comrie Road, Crieff.
 PETER W. CRAWFORD, Dryfeholm, Lockerbie.
 JAMES DURNO, Crichtie, Inverurie.
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 WILLIAM I. ELLIOT, Middletoun, Stow, Midlothian.
 GEORGE GRANT of Glenfarclas, Blacksboat.
 WILLIAM HOGG, Clackmae, Earlston.
 J. E. KERR of Harviestoun, Dollar,

JAMES KILPATRICK, Craigie Mains, Kilmarnock.
 JAMES R. LUMSDEN of Arden, Dumbartonshire.
 RALPH S. MACWILLIAM, Garguston, Muir-of-Ord, Ross-shire.
 A. W. MONTGOMERIE, O.B.E., Westburn Farm, Cambuslang.
 WILLIAM MONTGOMERY, Banks, Kirkcudbright.
 ALEXANDER MURDOCH, East Hallside, Cambuslang.
 ANDREW R. PAGE, Argyll Estates Office, Inveraray.
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 WILLIAM D. SIMPSON, Highfield, North Berwick.
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 Captain R. J. THOMSON, Kaimes, West Linton.
 FRANCIS W. WALKER of Leys, Leys Castle, Inverness.
 JAMES WITHER, Awhirk, Stranraer.
 JAMES WYLLIE, Beaumont, Victoria Road, Dumfries.
 A. E. CAMERON, M.A., D.Sc., University of Edinburgh, 10 George Square,
 Edinburgh, Consulting Zoologist, *ex officio*.

7. GENERAL PURPOSES.

JAMES R. LUMSDEN of Arden, Dumbartonshire, Chairman of Board of
 Directors, *Convener*.
 R. SCOTT AITON, M.C., Legerwood, Earlston.
 J. W. ALEXANDER, M.V.O., Langshaw, Moffat.
 WILLIAM ALLISON, Almond Hill, Kirkliston.
 THOMAS BLACK, Balig, Doonfoot, Ayr.
 JAMES DURNO, Crichtie, Inverurie.
 The EARL OF ELGIN AND KINCARDINE, K.T., C.M.G., Broomhall, Dun-
 fermeline.
 WILLIAM I. ELLIOT, Middletoun, Stow, Midlothian.
 JAMES JOHNSTON, Dunmore Home Farm, Falkirk.
 J. E. KERR of Harviestoun, Dollar.
 J. C. WALLACE MANN, Carrington Barns, Gorebridge.
 IAN C. MENZIES, O.B.E., Broomhills, Liberton, Edinburgh.
 ALEXANDER MURDOCH, East Hallside, Cambuslang.
 Sir JOSHUA ROSS-TAYLOR, Mungoswalls, Duns.
 WILLIAM D. SIMPSON, Highfield, North Berwick.
 MATTHEW TEMPLETON, Goshen Bank, Kelso.
 Captain R. J. THOMSON, Kaimes, West Linton.

8. EDUCATION.

Sir JOSHUA ROSS-TAYLOR, Mungoswalls, Duns, *Convener*.
 JAMES R. LUMSDEN of Arden, Dumbartonshire. .
 IAN C. MENZIES, O.B.E., Broomhills, Liberton, Edinburgh.
 ALEXANDER MURDOCH, East Hallside, Cambuslang.
 JOHN STIRTON, O.B.E., 8 Eglinton Crescent, Edinburgh.

9. OFFICE-BEARERS.

Constitution : (1) The four Ordinary Directors for the Division in which the Show for the year is to be held (with the exception of one retiring next year) ; (2) one Ordinary Director from each of the other Show Divisions ; and (3) the Chairman of the Board, Treasurer, and Hon. Secretary, *ex officio*.

<i>Perth</i>	. JOHN NIVEN, Gloagburn, Tibbermore ; THOMAS A. WEDDERSPOON, Castleton, Eassie, Angus ; JAMES PATON, C.B.E., Kirkness, Glencairg.
<i>Glasgow</i>	. JAMES KILPATRICK, Craigie Mains, Kilmarnock.
<i>Aberdeen</i>	. JAMES DURN, Crichtie, Inverurie.
<i>Borders</i>	. MATTHEW TEMPLETON, Goshen Bank, Kelso.
<i>Stirling</i>	. JAMES JOHNSTON, Dunmore Home Farm, Falkirk.
<i>Dumfries</i>	. WILLIAM MONTGOMERY, Banks, Kirkcudbright.
<i>Edinburgh</i>	. WILLIAM ALLISON, Almond Hill, Kirkliston.
<i>Inverness</i>	. Captain IAN S. ROBERTSON, Linkwood, Elgin.

JAMES R. LUMSDEN of Arden, Dumbartonshire, Chairman of Board of Directors, *ex officio*.

Sir JOSHUA ROSS-TAYLOR, Mungoswalls, Duns, Treasurer, *ex officio*.

ALEXANDER MURDOCH, East Hallside, Cambuslang, Honorary Secretary, *ex officio*.

REPRESENTATIVES ON OTHER BODIES.

National Agricultural Examination Board and National Dairy Examination Board.

JAMES R. LUMSDEN of Arden, Dumbartonshire.

IAN C. MENZIES, O.B.E., Broomhills, Liberton, Edinburgh.

ALEXANDER MURDOCH, East Hallside, Cambuslang.

JAMES PATON, C.B.E., Kirkness, Glencairg.

Sir JOSHUA ROSS-TAYLOR, Mungoswalls, Duns.

JOHN STIRTON, O.B.E., 8 Eglinton Crescent, Edinburgh.

Edinburgh and East of Scotland College of Agriculture.

JOHN STIRTON, O.B.E., 8 Eglinton Crescent, Edinburgh.

West of Scotland Agricultural College.

JAMES R. LUMSDEN of Arden, Dumbartonshire.

Aberdeen and North of Scotland College of Agriculture.

JAMES DURN, Crichtie, Inverurie.

Royal (Dick) Veterinary College.

WILLIAM D. SIMPSON, Highfield, North Berwick.

Glasgow Veterinary College.

ALEXANDER MURDOCH, East Hallside, Cambuslang.

Animal Diseases Research Association.

JAMES WITHER, Awhirk, Stranraer.

Scottish Agricultural Organisation Society, Ltd.

WILLIAM ALLISON, Almond Hill, Kirkliston.

WILLIAM D. SIMPSON, Highfield, North Berwick.

Scottish Milk Records Association.

JAMES KILPATRICK, Craigie Mains, Kilmarnock.

JAMES WITHER, Awhirk, Stranraer.

National Trust for Scotland.

Sir JOSHUA ROSS-TAYLOR, Mungoswalls, Duns.

Royal Scottish Agricultural Benevolent Institution.

JAMES R. LUMSDEN of Arden, Dumbartonshire.

Association for the Preservation of Rural Scotland.

J. W. ALEXANDER, M.V.O., Langshaw, Moffat.

Scottish Country Industries Development Trust.

The EARL OF ELGIN AND KINCARDINE, K.T., C.M.G., Broomhall, Dunfermline.

Scottish Association of Young Farmers' Clubs.

JAMES WITHER, Awhirk, Stranraer.

SCOTTISH PLANT REGISTRATION STATION.

Standing Committee of Management.

Major R. F. BREBNER, C.B.E., The Leuchold,
Dalmeny House, Edinburgh.
WILLIAM D. SIMPSON, Highfield, North Berwick.
JAMES WITHER, Awhirk, Stranraer.

*Appointed for
5 years from 1st
January 1946.*

MEETINGS.

General Meetings.—By the Charter the Society must hold two General Meetings each year, and, under ordinary circumstances, they are held in the months of January and June, for the election of Members and other business. Twenty a quorum.

By a resolution of the General Meeting held on 15th January 1879, a General Meeting of Members is held in the Showyard on the occasion of the Annual Show.

With reference to motions at General Meetings, Bye-Law No. 19 provides that—"At General Meetings of the Society no motion or proposal (except of mere form or courtesy) shall be submitted or entertained for immediate decision unless notice thereof has been given two weeks previously to the Board of Directors, without prejudice, however, to the competency of a motion or proposal, of which due notice has not been given, being remitted to the Directors for consideration, and thereafter being disposed of at a future General Meeting."

Directors' Meetings.—The Board of Directors meet (except when otherwise arranged) on the first Wednesday of each month from November to June, inclusive, at 1.30 p.m., and occasionally as business may require, on a requisition by three Directors to the Secretary, or on intimation by him. Seven a quorum.

Committee Meetings.—Meetings of the various Committees are held as required.

Nomination of Directors.—Meetings of Members, for the purpose of nominating Directors to represent the Show Divisions on the Board for the year 1948-1949, will be held at the places and on the days after-mentioned :—

DIVISION.		
1. <i>Edinburgh.</i>	Market Buildings, Gorgie, Edinburgh	. Wed., 28th Jan. 1948, at 1.
2. <i>Glasgow.</i>	Central Station Hotel, Glasgow	. Wed., 11th Feb. 1948, at 1.
3. <i>Stirling.</i>	Golden Lion Hotel, Stirling	. Thur., 12th Feb. 1948, at 1.30.
4. <i>Perth.</i>	..... Perth	. Fri., 13th Feb. 1948, at 2.
	(The Meeting will be held in 1949 at Perth and in 1950 at Cupar.)	
5. <i>Borders.</i>	County Buildings, St Boswells	. Thur., 19th Feb. 1948, at 3.
6. <i>Inverness.</i>	Station Hotel, Inverness	. Tues., 21st Feb. 1948, at 2.
7. <i>Aberdeen.</i>	Imperial Hotel, Aberdeen	. Fri., 27th Feb. 1948, at 2.30.
8. <i>Dumfries.</i>	King's Arms Hotel, Dumfries	. Wed., 10th March 1948, at 2.30.

The nomination of a Proprietor or other Member paying the higher subscription must be made in the 3rd, 6th, 7th and 8th Divisions ; and the nomination of a Tenant-Farmer or other Member paying the lower subscription in the 1st, 2nd, 4th and 5th Divisions.

A Member who has served as an Ordinary Director for a term of four years is not eligible to be nominated again till after the lapse of at least one year. An Extraordinary Director may, however, be nominated as an Ordinary Director.

GENERAL SHOW.

Since the outbreak of War in September 1939 no Shows have been held.

EXAMINATIONS.

Agriculture.—In order to assist candidates at the English and Welsh Colleges, the Examination in 1947 for the National Diploma in Agriculture will be held (1) at Edinburgh on Wednesday, 9th April, and following days. Applications close on Thursday, 20th February ; (2) at Leeds on Tuesday, 8th July, and following days. Applications close on Tuesday, 20th May.

Dairying.—The Examinations in 1947 for the National Diploma in Dairying will be held as under :—

SCOTLAND.—At the Dairy School for Scotland, Auchincruive, Ayr : *Written*—On Tuesday, Wednesday, Thursday, and Friday, 2nd, 3rd, 4th, and 5th September. *Oral and Practical*—On Monday, 15th September, and following days. Last date for receiving applications, Thursday, 31st July.

ENGLAND.—At the University and British Dairy Institute, Reading, on Tuesday, 2nd September, and following days. Last date for receiving applications, Monday, 21st July.

Forestry.—The Final Examination for the Society's First and Second-Class Certificates in Forestry was held in 1935.

In view of the institution of Examinations for Certificates and Diplomas in Forestry by the Royal Scottish Forestry Society, and by arrangement with that Society, the Board of Directors of the Highland and Agricultural Society of Scotland resolved in 1935 to cease holding further Examinations for the First and Second-Class Certificates, and that, in future, the granting of Certificates and Diplomas be left in the hands of the Royal Scottish Forestry Society.

All communications in connection with Examinations in Forestry should now be addressed to the Secretary, Royal Scottish Forestry Society, 8 Rutland Square, Edinburgh 1.

NATIONAL DIPLOMA IN AGRICULTURE

By a Supplementary Charter under the Great Seal, granted in 1856, the Society is empowered to grant Diplomas.

From 1858 to 1899 the Society held an annual Examination for Certificate and Diploma in Agriculture. In 1873 the Free Life Membership of the Society was granted to winners of the Diploma. In 1882 permission was given to holders of the Diploma to append the letters F.H.A.S. to their names. These arrangements terminated in 1899.

In 1898 it was resolved by the Royal Agricultural Society of England and the Highland and Agricultural Society of Scotland to discontinue the independent Examinations in Agriculture held by the two Societies, and to institute in their stead a Joint Examination for a NATIONAL DIPLOMA IN AGRICULTURE (N.D.A.). This Examination is conducted under the management of "The National Agricultural Examination Board" appointed by the two Societies. The first Joint Examination was held in 1900.

REGULATIONS FOR EXAMINATION IN THE SCIENCE AND PRACTICE OF AGRICULTURE

EXAMINATIONS IN 1947.

1. The Societies may hold conjointly, under the management of the National Agricultural Examination Board appointed by them, an Annual Examination in the Science and Practice of Agriculture, at a convenient centre.

2. Candidates who pass the Examination will receive the National Diploma in Agriculture—the Diploma to be distinguished shortly by the letters "N.D.A."

3. The Examination will be conducted by means of written papers and oral examinations.

4. In order to be eligible to sit for the Board's Examination in Agriculture, a candidate must—

(a) Present a certificate from a recognised Agricultural College that his attainments in the subjects of *General Botany, Geology, General Chemistry, Physics, and Mechanics*, as attested by class and other examinations, are, in the opinion of the authorities of the College, such as to justify his admission to the Board's Examination; *or*

(b) Produce evidence that he has passed the 1st B.Sc. or the Intermediate Examination in Science of a British University; *or*

(c) Present a School Certificate awarded by a British University Examination Board, and produce evidence that he has continued his study of science for at least a year and has obtained a certificate in Physics, Chemistry, and Botany at the Higher Certificate Examination of a British University Examination Board; *or*

(d) Present a Leaving Certificate in Science (including Chemistry and Botany) of the Scottish Education Department.

5. In the case of students who satisfy the Board that they have not had the facilities for obtaining the foregoing certificates, the Board will be prepared to consider evidence of equivalent attainment. [Applications under this rule must be lodged *three months* before the date of the annual examination.]

6. *Before sitting for the PRACTICAL AGRICULTURE and FARM MACHINERY AND IMPLEMENTS papers, all candidates must produce evidence of possessing a practical knowledge of Agriculture obtained by residence on a farm in the British Isles for a period or periods (not more than two) covering a complete year of farming operations.*

7. Candidates will have the option of taking the whole of the following nine papers at one time, or of sitting for a group of *any three, four, or five* in the first year and the remaining subjects (at one examination) within the next two years:—

SUBJECT.	Maximum Marks.	Pass Marks.
1. Practical Agriculture (First Paper)	400	240
2. Practical Agriculture (Second Paper)	400	240
3. Farm Machinery and Implements	300	150
4. Land Surveying and Farm Buildings	100	50
5. Agricultural Chemistry . . .	200	100
6. Agricultural Botany . . .	200	100
7. Agricultural Book-keeping . . .	200	100
8. Agricultural Zoology . . .	100	50
9. Veterinary Science and Hygiene .	200	100
	2100	1130

NOTE.—Candidates taking the Examination in two groups of subjects are recommended to take Agricultural Chemistry and Agricultural Botany in the first group.

8. A candidate who obtains not less than three-fourths (1575) of the aggregate maximum marks (2100) in the entire Examination will receive the Diploma with Honours, provided that he obtains not less than three-fourths (600) of the maximum marks (800) in the two Practical Agriculture papers.

9. Candidates electing to take the entire Examination at one time and failing in not more than three subjects may appear for these subjects in the following year. Failure in more than three subjects will be regarded as failure in the whole Examination.

10. In the case of candidates electing to take the Examination in two groups—

(a) A candidate appearing for a group of *three* subjects and failing in a single subject may, *in the case of a first group*, appear for that subject along with the second group, or, *in the case of a second group*, in the following year. Failure in more than one subject will be regarded as failure in the group.

(b) A candidate appearing for a group of *four* or more subjects and failing in not more than two subjects may, *in the case of a first group*, appear for these subjects along with the second group, or, *in the case of a second group*, in the following year. Failure in more than two subjects will be regarded as failure in the group.

11. Non-returnable fees must be paid by candidates as follows :—

Entire Examination	Six guineas.
Group of subjects	Three guineas.
Reappearance for any subjects	10/6 per subject.

12. The Board reserve the right to postpone, abandon, or in any way, or at any time, modify an Examination, and also to decline at any stage to admit any particular candidate to the Examination.

EXAMINATIONS IN 1947.

Two Examinations will be held in 1947.

Candidates will be permitted to appear at EITHER of these, but not at both.

The Examinations will be held as under :—

SCOTLAND.—At the University of Edinburgh and in the Chambers of the Highland and Agricultural Society of Scotland, 8 Eglinton Crescent, on WEDNESDAY, 9th APRIL 1947, and following days. Last date for receiving Applications, THURSDAY, 20th FEBRUARY 1947.

ENGLAND.—At the University of Leeds, on TUESDAY, 8th JULY 1947, and following days. Last date for receiving Applications, TUESDAY, 20th MAY 1947.

Forms of Application for permission to sit at either Examination may be obtained from : “The Secretary, Royal Agricultural Society of England, 16 Bedford Square, London, W.C.1,” or from “The Secretary, Highland and Agricultural Society of Scotland, 8 Eglinton Crescent, Edinburgh, 12.”

SYLLABUS OF SUBJECTS OF EXAMINATION.

PRACTICAL AGRICULTURE.

1.—FIRST PAPER.

1. *British Farming.*—Arable, stock-raising, dairying—Approximate areas covered by the different systems—Typical examples of each—Area in Great Britain under chief crops—Numbers of live stock—The recent history of agriculture—Short summary of agricultural returns.

2. *Climate.*—The effect of climate on farming practice—Rainfall—Temperature—Prevailing winds—Weather forecasts.

3. *Soils.*—The influence of geological formations on the systems of farming—Classification of soils—Character and composition—Suitability for cultivation. Reclamation—Drainage—Irrigation—Warping—Application of lime and marl—Bare fallows—Tillage—Subsoiling—Deep and thorough cultivation.

4. *Manures*.—The manures of the farm—The treatment of farm-yard manure—The disposal of liquid manure and sewage—General manures—Special manures—Field trials of manures—The application of manures—Period of application and amounts used per acre—Unexhausted value of manures and feeding-stuffs.

5. *Crops*.—Wheat, barley, oats, rye, beans, peas, potatoes, turnips, swedes, mangolds, sugar beet, forage plants, hops, and other crops—Their adaptation to different soils and climates—Varieties—Selection of seed—Judging seeds—Cultivation, weeds and parasitic plants, best methods of prevention and eradication—Harvesting—Storing—Cost of production—Improvement of crops by selection and hybridising—Field trials—Methods which the farmer may adopt—Selection to resist disease—The principles of rotations—Rotations suitable for different soils and climates—Rotations and the maintenance of fertility—Green manuring—Leguminous crops in rotation—Catch crops—The advantages and disadvantages of rotations—Specialised farming—Management of Orchards.

2.—SECOND PAPER.

6. *Live Stock*.—The different breeds of British live stock—Their origin, characteristics, and comparative merits—Suitability for different districts—Breeding—General principles—Selection—Mating—Crossing—Rearing and general management—Breeding and rearing of horses, cattle, sheep, pigs, and poultry. Rearing colts and raising store stock—The foods of the farm—Their composition and suitability for different classes of stock—Purchased foods—Composition and special value—Rations for different kinds and ages of stock—Cost of producing beef, mutton, pork, and milk—Cost of feeding farm horses.

7. *The disposal of Crops, Produce, and Stock*.—Marketing grain and other crops—Sale of stock—Live weight—Dead weight.

8. *Milk*.—The production and treatment of milk—The manufacture of cheese, butter, &c.—The utilisation of by-products.

9. *Farming Capital*.—Calculations of the stocking and working of arable, stock, and dairy farms—Farm valuations—Rent and taxes.

10. *Labour*.—Organisation of labour—piece-work, time-work—labour costings.

11. *Renting a Farm*.—Indications of condition, productive power, and stock-carrying capacity—Leases—Conditions of occupancy.

N.B.—*It is essential that a candidate know his subject practically, and that he satisfy the Examiner of his familiarity with farm work and management.*

3.—FARM MACHINERY AND IMPLEMENTS.

1. *Power*.—The principle of action, construction, method of working, also care and management of steam engines and boilers, gas, oil and petrol engines and agricultural tractors. Cost and working expenses in connection with the above. Estimation of the brake horse-power of engines. Power derived from water. Measurement of the quantity of water flowing in a stream. General arrangement of water-power plants. Water-wheels. Turbines. Pumps—

principle of action and construction. Flow of water through pipes. Hydraulic ram. Windmills.

2. *Agricultural Implements and Machinery.*—The mode of action and the general principles involved in the construction and working of farm implements and machinery. Arrangements of machinery with respect to the power plant. Pulleys and belting. Shafting and bearings. Lubrication. Lifting appliances. Strength and care of chains. Concrete and its use in the construction of simple foundations for engines and machines.

3. *Implements of Cultivation.*—Ploughs—Cultivators—Grubbers—Harrows—Drills. Manure Distributors. Seeding and planting implements.

4. *Implements of Harvesting.*—Mowing and Reaping machines—Combine harvesters—Pick-up balers—Rakes—Teddies—Elevators—Potato raisers—Beet harvesters.

5. *Implements of Transit.*—Carts, waggons, rick lifters, tractors.

6. *Threshing and Food-preparing Machinery.*—Threshing machines, stationary and portable—Screen Winnowers—Hummelers, Chaff cutters—Pulpers—Cake breakers.

7. *Dairy Appliances.*—Milking machines—Cream separators—Churns and other butter-working appliances—Milk delivery cans—Cheese-making utensils—Vats and presses.

N.B.—Candidates are expected to have had some experience with agricultural machinery and implements under actual working conditions, and to be capable of illustrating their answers, when necessary, by intelligible sketches or diagrams.

4.—LAND SURVEYING AND FARM BUILDINGS.

1. The use and adjustment of instruments employed in Surveying and Levelling other than the Theodolite.

2. Land surveying by chain, Plotting from field book, and determination of areas surveyed. The simpler "field problems."

3. Levelling and plotting from field book.

4. A knowledge of the various classes of maps published by the Ordnance Survey Department and their Scales.

5. *Roads and Fences.*—The construction and maintenance of farm roads, fences, and ditches.

6. *Land Drainage.*—Methods of draining; mole and pipe drains; cost of construction and maintenance.

7. *Buildings.*—Buildings required on different classes of farms—Economical arrangement of farm buildings—Materials—Construction—Ventilation—Drainage—Water supply—Dimensions of dairy, stables, cow-sheds, yard, courts, and piggeries—Accommodation for power—Implement, machinery, and cart sheds—Hay and grain sheds—Shelter sheds—Storage of manure.

N.B.—Each candidate should have with him at the Examination a pair of compasses, scales of equal parts, including scales of one chain to the inch, 4 feet to the inch, 8 feet to the inch, and the scale fitting the Ordnance Map, $\frac{1}{2500}$ or 25·344 inches to the mile, a small protractor, a set-square, and a straight-edge about 18 inches in length.

5.—AGRICULTURAL CHEMISTRY.

1. *The Atmosphere*.—Its composition and relations to plant and animal life.

2. *Water*.—Rain water—Soil water and drainage—Drinking water—Sewage and irrigation.

3. *The Soil*.—Origin, formation, and classification of soils—Sampling—Analysis—Composition of soils—The chemical and physical properties of soils—The water and air of the soil—Biological changes in the soil—The soil in relation to plant growth—Fertility—Causes of infertility—Improvement of soils.

4. *Manures*.—Theories of manuring—Classification of manures—Origin, nature, and characteristics of manures—Manufacture of manures—Composition, analysis, adulteration, and valuation of manures—Farmyard manure and other natural manures—Green-manuring—Liming, marling, claying—Artificial manures, their origin and manufacture—Fertilisers and Feeding Stuffs Act—Sampling of manures.

5. *Poisons, Antiseptics, and Preservatives*.—General chemical composition and character of insecticides, fungicides, antiseptics, and preservatives used on the farm.

6. *Plants and Crops*.—Constituents of plants—Assimilation and nutrition of plants—Sources of the nitrogen and other constituents of plants—Germination—Action of enzymes—Composition and manurial requirements of farm crops—Food products derived from crops—Manuring experiments.

7. *Animals*.—Composition of animal body—Animal nutrition—Digestion—Assimilation, metabolism, respiration, and excretion.

8. *Foods and Feeding*.—Constituents of foods—Origin, nature, and composition of chief feeding stuffs—Sampling, analysis, and adulteration of foods—Nutritive value and digestibility of food—Functions of chief food constituents—Energy values—Vitamins—Relation of foods to the production of work, meat, milk, and manure—Manurial residues of foods.

9. *Dairy Chemistry*.—The composition of milk, cream, butter, cheese, &c.—Conditions which influence the composition of milk and milk products—Action of ferments and enzymes on milk and milk products—Milk-testing—Analysis and adulteration of dairy products.

N.B.—Candidates who are in possession of Laboratory Notes are required to bring them to the Oral Examination in this subject.

6.—AGRICULTURAL BOTANY.

In addition to a general knowledge of the morphology, histology, and physiology of plants, candidates will be expected to possess a detailed knowledge of the following subjects:—

The classification of plants of importance in agriculture as shown by a detailed study of the genera, species, and botanical varieties of the British Crop Plants and Weeds included in the following families:—

Ranunculaceæ.	Umbelliferaæ.	Chenopodiaceæ.
Cruciferaæ.	Compositæ.	Polygonaceæ.
Caryophyllaceæ.	Solanaceæ.	Liliaceæ.
Leguminosæ.	Scrophulariaceæ.	Gramineæ.
Rosaceæ.	Labiataæ.	

British grasses of agricultural importance : recognition of, at any stage of growth. Habitats of important species. Constitution of the grass flora of good meadows and pastures. Composition of seed mixtures for temporary and permanent leys on various soils. The effects of artificial manures on the flora of grass land.

The weeds of arable and grass land. Poisonous and parasitic weeds. Methods of distribution by seed and vegetatively : of eradication. Weeds as soil indicators. Recognition of the seeds of the common weeds, particularly those characteristically found in clover, grass, &c., seed.

The chief varieties of wheat, barley, oats, clovers, roots, and other farm crops ; their suitability for various climatic and soil conditions. The identification of the more important types of cereals by means of their grain characters. Characteristics of good and bad samples of cereals.

Identification of materials used in feeding cakes and meals.

Plant-breeding. Principles of heredity in plants. Pure lines. Fluctuating variability. Selection.

Disease in plants. Diseases due to the effects of parasitic fungi. Resistance to disease : conditions affecting. Fungoid diseases scheduled from time to time by the Ministry of Agriculture and Fisheries.

Yeasts and fermentation.

The general outlines of bacteriology : nitrogen fixation, nitrification, and denitrification. Putrefaction and the bacteriology of milk, butter, and cheese.

N.B.—Candidates who are in possession of Laboratory Notes are required to bring them to the Oral Examination in this subject.

7.—AGRICULTURAL BOOK-KEEPING.

1. Advantages of book-keeping to the farmer. Difficulties and how they can be overcome. Objects of book-keeping.

2. General principles of book-keeping. Double-entry system. Description and use of various books. Ledger, journal, cash-book, petty cash-book, day-books, &c. Entering transactions ; posting ; trial balance ; closing the accounts. Single-entry system.

3. Special ledger accounts : Interest, depreciation, rent and rates, improvements, private and household expenses, profit and loss and capital ; partnership accounts.

4. Bank business. Opening a bank account. Use of cheques. Deposits and overdrafts.

5. General office work ; correspondence, order notes, invoices, rendering accounts, receipts, &c. Filing systems.

6. Farm valuations for book-keeping purposes. Dates for stock-taking and principles of valuation. The farm balance-sheet.

7. Systems of farm book-keeping. Conditions that determine the most suitable system. Advantages and drawbacks of each system.

8. Accounts for the owner-occupier. Treatment of rent. Incidence of rates and tithe in England and Scotland, and their treatment as between farm and estate accounts. Improvements and upkeep and the general principles relating to maintenance claims.

9. Cost accounting. General principles and methods. Advantages, objects, difficulties.

10. Interpretation of results from ordinary and from cost accounts. Precautions necessary. Use of accounts as a guide to efficient management.

11. Income Tax. How the farmer is assessed. Preparation of Income Tax return. Treatment of Income Tax in accounts.

8.—AGRICULTURAL ZOOLOGY.

The Examination is designed to test practical knowledge, and therefore candidates will be expected to recognise the animals of agricultural importance referred to in the Syllabus.

GENERAL.

A general knowledge of the characteristics of living animals and how they differ from plants.

One-celled animals, *e.g.*, Amœba, and many-celled animals.

General outline of the classification of animals and the characters on which it is based.

Organic Evolution. Theories of Heredity.

SPECIAL.

I. *Invertebrates*.—A. The Worm Parasites of Stock. Flat and Round Worms. Structure and Life History, for example, of Liver-fluke, Tapeworm, Ascaris. The mode of life and life history of the chief worm enemies of the domesticated animals. Preventive and remedial measures.

B. The Arachnid enemies of Stock: Mange or Scab Mites, Demodex Mites, Ticks. External structure and life history. Control measures.

C. The Insect enemies of Stock: (a) External parasites, *e.g.*, gadflies, warble flies, blue-bottles, green-bottles, stable fly, ked, lice; (b) Internal parasites, *e.g.*, bot and warble flies.

D. Insects injurious to Crops: Structure and classification of insects. Mode of life and life history of the chief insect pests of agricultural crops.* Control, preventive and remedial measures—natural control; artificial control (Insecticides).

* The chief pests are detailed in Pamphlets issued by the Ministry of Agriculture and Fisheries.

E. Other invertebrates of agricultural importance, *e.g.*, earth-worms, eelworms, slugs and snails, centipedes and millepedes, gall mites.

II. *Vertebrates*.—Birds: the commoner birds of farm importance, their recognition and an estimate of their work.

Mammals: Outstanding characters for recognition, and the economic importance of:—

1. Ungulata or Hoofed Mammals, *e.g.*, horse, pig, cattle, sheep, deer.
2. Rodentia or Gnawing Mammals, *e.g.*, hares, rabbits, rats, mice, voles, squirrels.
3. Insectivora, *e.g.*, mole, hedgehog, shrew.
4. Carnivora, *e.g.*, dog, fox, polecat, stoat, weasel, badger.

N.B.—Candidates who are in possession of Laboratory Notes are required to bring them to the Oral Examination in this subject.

9.—VETERINARY SCIENCE AND HYGIENE.

1. Elementary anatomy and physiology of the horse, ox, sheep, and pig, and their relation to unsoundness and disease.

2. The general principles of breeding—including the physiology of reproduction, the laws of heredity, the periods of gestation, and the signs of pregnancy in the mare, cow, ewe, and sow.

3. Dentition as a means of determining the age of horses, cattle, sheep, and swine.

4. The management of farm stock in health and disease.

N.B.—Candidates who are in possession of Laboratory Notes are required to bring them to the Oral Examination in this subject.

WINNERS OF DIPLOMA IN 1946.

EDINBURGH EXAMINATION.

Diploma.

BRIAN ANTHONY LINGARD ACKROYD, University of Leeds.

CHARLES DURNING AIKMAN, University of Glasgow and West of Scotland Agricultural College.

RONALD HUGH ALEXANDER, West of Scotland Agricultural College.

DAVID WILLIAM ANDERSON, West of Scotland Agricultural College.

WILLIAM ARNOLD ASHLEY, King's College.

IAN JOSEPH ASHWORTH, University of Leeds.

VICTOR JOHN DESMOND BALDEY, University of Leeds.

WILLIAM JOHN BASSETT, University of Leeds.

JACK BRADWELL, University of Leeds.

EDWARD WILLIAM BRIGNALL, University of Leeds.

JOHN WILSON BROWN, West of Scotland Agricultural College.

WILLIAM BUCHANAN, University of Glasgow and West of Scotland Agricultural College.

PETER BUCKLER, South Eastern Agricultural College.

MALCOLM EDWARD CASTLE, University of Leeds and West of Scotland Agricultural College.

ROY KEITH CLARKE, Midland Agricultural College.

HUGH MACKAY CLARKSON, Edinburgh and East of Scotland College of Agriculture.

WILLIAM SYDNEY CLAYTON, Harper Adams Agricultural College.

ALAN CLEGG, King's College.

PETER JOHN COATES, Midland Agricultural College.

DAVID WILLIAM VINCENT CROSS, Harper Adams Agricultural College.

ALASTAIR PATRICK GRANT, Aberdeen University.

HARRY TAYLOR GRANT, University of Glasgow, West of Scotland Agricultural College, and Midland Agricultural College.

FRANK BRAITHWAITE HALL, University of Reading.

JOHN ERNEST HARRISON, Harper Adams Agricultural College.

JAMES DONALDSON HENDRY, University of Glasgow and West of Scotland Agricultural College.

CHARLES GRAHAME HOYTE, Edinburgh and East of Scotland College of Agriculture.

GERARD KELLY, West of Scotland Agricultural College.

BERNARD LAW, University of Glasgow and West of Scotland Agricultural College.

ROBERT AUSTIN LEWIS, University of Leeds.

CHARLES ANTHONY LITT, Harper Adams Agricultural College.

GEORGE LYGO, 115 Station Road, Hatton, Derbyshire.

ROBERT M'BRIDE, West of Scotland Agricultural College.

GEORGE WYLLIE M'HARG, West of Scotland Agricultural College.

HELEN CHRISTINE M'IVER, University of Edinburgh and Edinburgh and East of Scotland College of Agriculture.

DONALD NEIL M'VEAN, University of Glasgow and West of Scotland Agricultural College.

DOROTHY MASTERS, Harper Adams Agricultural College.

GEOFFREY THOMAS MOLLART, Midland Agricultural College.

ALEXANDER M'LAREN MORTON, West of Scotland Agricultural College.

BRIAN JACK O'BRIEN-GORE, Harper Adams Agricultural College.

ALEXANDER BRIAN PENGILLY, University of Leeds.

JOHN EDWARD PEPPER, Midland Agricultural College.

GEORGE WILLIAM EDWARD PICKWORTH, Harper Adams Agricultural College.

GEORGE POLLOCK, Greenmount Agricultural College.

DOROTHY ESTELLE PRICE, West of Scotland Agricultural College.

JOHN ROBINSON PROUD, University of Leeds.

JOHN DUDLEY REYNOLDS, West of Scotland Agricultural College.

ELIZABETH ELLEN RICHARDS, Harper Adams Agricultural College.

JAMES STEWART ROBERTSON, University of Glasgow and West of Scotland Agricultural College.

JOHN ROGERSON, University of Glasgow and West of Scotland Agricultural College.

SILVAN ALEXANDER ROSS, West of Scotland Agricultural College.

NIGEL FRANCIS SAMPSON, Midland Agricultural College.

PETER ROBERT SCOWCROFT, University of Leeds.

DOREEN ISOBEL SMITH, Edinburgh and East of Scotland College of Agriculture.

MARY WAUGH STEELE, University of Glasgow and West of Scotland Agricultural College.

MARGUERITE DAPHNE STEVENSON, Midland Agricultural College.

JOSEPHINE ELISABETH TAYLOR, Midland Agricultural College.

DOROTHY MARGARET WHYTE, West of Scotland Agricultural College.

GEOFFREY DELVES WILKINSON, Midland Agricultural College.

JAMES WILSON, West of Scotland Agricultural College.

BRYAN ARTHUR WOODWARD, Midland Agricultural College.

LEEDS EXAMINATION.

Diploma.

GEORGE RONALD ADAMS, Harper Adams Agricultural College.
 HENRY DUKESEL AINSLEY, University of Leeds.
 LUCIUS CHARLES ARTHUR, Harper Adams Agricultural College.
 JOHN LEONARD BAWTREE, University of Reading.
 DAVID HASSALL BEECH, University of Leeds.
 JAMES CHARLES ELLINGWORTH BEVIN, Harper Adams Agricultural College.
 HELEN MAY BOWMAN, Midland Agricultural College.
 REGINALD BRILL, Midland Agricultural College.
 NEVILLE WILLIAM BROADHURST, Harper Adams Agricultural College.
 DAVID CALCOTT, University of Reading.
 GRAHAM REID CARSLAW, West of Scotland Agricultural College.
 MARY D. CLARK, West of Scotland Agricultural College.
 ALISON MARY CLARKE, Midland Agricultural College.
 IAN WATSON CLEWLEY, University of Reading.
 DENNIS RITSON COLDWELL, King's College.
 ALFRED WILLIAM COOPER, Harper Adams Agricultural College.
 FRANK BRYAN COTTRELL, Harper Adams Agricultural College.
 JOHN WILLIAM CHARLES COXON, Midland Agricultural College.
 ERNEST WILLIAM GEORGE CROUCH, Seale-Hayne Agricultural College.
 ALBERT DOCKER, Harper Adams Agricultural College.
 MICHAEL FRANK DODD, Harper Adams Agricultural College.
 *FRANCIS WILLIAM ELLIS, Essex Institute of Agriculture.
 PETER FREDERICK FREEMAN, Seale-Hayne Agricultural College.
 ALFRED ROY GALBRAITH, Seale-Hayne Agricultural College.
 PETER CHARLES GRAVETT, Seale-Hayne Agricultural College.
 ROSS FRANK DAVID HADDOU, Midland Agricultural College.
 MALCOLM ROY HARRIMAN, Seale-Hayne Agricultural College.
 EDWIN JOHN HETHERINGTON, King's College.
 WILFRED LYNN HINTON, Harper Adams Agricultural College.
 HENRY RICHARD HOLBOROW, University of Reading.
 MILES HOLLAND-RAMSAY, Seale-Hayne Agricultural College.
 GEOFFREY ROWLAND HOLMES, Midland Agricultural College.
 REGINALD HARRY ISAAC, Midland Agricultural College.
 TREVOR WILLIAM KEMSLEY, University of Reading.
 IAN MORGAN KERR, Harper Adams Agricultural College.
 RICHARD ALEXANDER LEACH, Seale-Hayne Agricultural College.
 REGINALD JOSEPH LONGSTREET, Seale-Hayne Agricultural College.
 WILLIAM MACKENZIE, University of Glasgow.
 MARK M'LEAN, Midland Agricultural College.
 PETER ALLEN MARSDEN, Midland Agricultural College.
 JASON BASIL MERMIDIDES, University of Reading.
 ROBERT WILLS MITTER, Seale-Hayne Agricultural College.
 ALAN DEREK NORRIS, Seale-Hayne Agricultural College.
 THOMAS OKEY, University of Reading.
 ARTHUR DEREK PARKER, Seale-Hayne Agricultural College.
 REX WILLIAM PICKFORD, Royal Agricultural College.
 WILLIAM ERIC FRAME RANKIN, Harper Adams Agricultural College.

* Passed a first group of subjects while a prisoner-of-war in Germany.

JUNE RAYMENT, Seale-Hayne Agricultural College.
 ALLEN FLETCHER REES, Seale-Hayne Agricultural College.
 HUMPHREY GETHIN REES, Seale-Hayne Agricultural College.
 KENNETH LAMBERT RICHARDS, Seale-Hayne Agricultural College.
 BARRY MAXWELL ROBINSON, Harper Adams Agricultural College.
 DOUGLAS FREDERICK LANGLEY ROSE, Harper Adams Agricultural College.
 SYLVIA MARY RUSSELL, Midland Agricultural College.
 PHILIP SHINGLER, Harper Adams Agricultural College.
 PHILIP HENRY SHUCKSMITH, Midland Agricultural College.
 GEORGE ROBERT SIGSWORTH, University of Leeds.
 *PHILIP LIONEL D'E. SKIPWITH, Rapleys, Grazeley Green, near Reading.
 WALTER NORMAN SMITH, University of Leeds.
 WILLIE SMITH, Seale-Hayne Agricultural College.
 JEAN INSTONE SMITHEMAN, Harper Adams Agricultural College.
 GORDON JAMES FARMER STEVENS, Seale-Hayne Agricultural College.
 CLIFFORD STEVENSON, Midland Agricultural College.
 ENA MARGARET STEWART, Midland Agricultural College.
 MICHAEL MENZIES STRANG, Harper Adams Agricultural College.
 CHARLES KEITH SYKES, Midland Agricultural College.
 JOSEPH DONALD SYKES, University of Leeds.
 PETER WILLIAM TAYLOR, Midland Agricultural College.
 PHILIP ARTHUR TAYLOR, Seale-Hayne Agricultural College.
 KEITH JAMES THOMPSON, Midland Agricultural College.
 JOHN WILLIAM THURLEY, Midland Agricultural College.
 MICHAEL RICHARD WARNER, Midland Agricultural College.
 MICHAEL CONRAD WELLER, Seale-Hayne Agricultural College.
 DENNIS TANSLEY WESTON, Midland Agricultural College.
 GEORGE HANSON WHITAKER, Seale-Hayne Agricultural College.
 JERRY WHITE, Midland Agricultural College.
 RICHARD JAMES WILLIS, West of Scotland Agricultural College.
 GLADYS WILSON, Midland Agricultural College.
 JAMES WYLLIE, University of Edinburgh.

* Passed in all papers while a prisoner-of-war in Germany; appeared at Leeds for oral examination only.

EXAMINATION PAPERS OF PAST YEARS.

Copies of papers set at past Examinations in AGRICULTURE, so far as available, may be had on application. Price 1/- per set.

Sets of N.D.A. Papers available are those for the years 1945 (April), 1945 (July), 1946 (April), 1946 (July).

NATIONAL DIPLOMA IN DAIRYING

This Examination, instituted in 1897, is conducted by "The National Dairy Examination Board," appointed jointly by the Royal Agricultural Society of England, the Highland and Agricultural Society of Scotland, and the British Dairy Farmers' Association.

REGULATIONS FOR EXAMINATION IN THE SCIENCE AND PRACTICE OF DAIRYING

EXAMINATION IN 1947.

1. The Societies may hold annually in England and Scotland, under the management of the National Dairy Examination Board appointed by them, one or more examinations for the National Diploma in the Science and Practice of Dairying, on dates and at places from time to time appointed and duly announced; the Diploma to be distinguished shortly by the letters "N.D.D."

2. Forms of entry for the Examination in England may be obtained from "The Secretary, Royal Agricultural Society of England, 16 Bedford Square, London, W.C.1." and must be returned to him duly filled up, with the entry fee, on or before 21st July 1947.

3. Forms of entry for the Examination in Scotland may be obtained from "The Secretary, Highland and Agricultural Society of Scotland, 8 Eglinton Crescent, Edinburgh 12," and must be returned to him duly filled up, with the entry fee, on or before 31st July 1947.

4. Any candidate may enter for the Examination either in England or Scotland, but not in both, and a candidate who has once taken part in an Examination in England cannot enter for an Examination in Scotland, or *vice versa*. *An exception may be made in favour of a candidate reappearing under Regulation 10 (3) provided special application is made at the time of entry.*

5. As a preliminary to the acceptance of any application for permission to enter for the Examination, a candidate must produce:—

(1) from the Head of an approved Dairy Training College or Institute:

(a) a statement that he or she is in possession of the General School Certificate (England), the Day School Certificate Higher (Scotland), or the School Certificate of the Central Welsh Board; or a statement that his or her general education is of an equivalent standard;

- (b) a certificate testifying that he or she has satisfactorily completed courses in (i) soils, crops, rotations, cultivations, manuring of crops (other than pastures), and plant physiology; (ii) elementary chemistry, physics and mechanics, *and*
 - (c) that he or she has also attended a Diploma or Degree course in the subjects of the Examination covering at least two academic years at an approved Dairy Training College or Institute, and has satisfied the authorities of the College or Institute of his or her fitness for admission to the Examination. *This period shall include six months' instruction (consisting of not more than two periods) in practical dairy work.*
 - (d) a certificate of proficiency in soft cheese-making.
- (2) a certificate of proficiency in the milking of cows, signed by a dairy farmer, and evidence that he or she has spent at least six months in not more than two periods on an approved dairy farm and taken part in the work, both in the dairy and on the land. *This period must not run concurrently with the six months' practical training referred to in sub-section 1 (c).*
A Dairy Farm to be approved must have not fewer than fifteen cows in milk.

6. A candidate who has already taken a Degree in Agriculture of a British University, or a Diploma in Agriculture recognised by the National Dairy Examination Board, will be allowed to enter for the National Diploma in Dairying Examination after one year's subsequent training at an approved Dairy Training College or Institute, providing that such course includes at least six months' training in practical dairy work, and that he or she has spent at least six months on an approved dairy farm, and taken part in the work both in the dairy and on the land.

7. In the Examination a candidate will be required to satisfy the Examiners by means of written papers, practical work, and *viva voce*, that he or she has :—

- (1) A general knowledge of the management of a dairy farm, including the rearing and feeding of dairy stock, the candidate being required to satisfy the Examiners that he or she has had a thorough training and practical experience in all the details of dairy work as pursued on a farm.
- (2) A thorough acquaintance with the practical details of the management of a dairy, and the manufacture of butter and cheese, together with a working knowledge of the scientific principles involved in these operations.
- (3) A general knowledge of dairy book-keeping.
- (4) Practical skill in dairying, to be tested by the making of butter and cheese.

NOTE.—A candidate must be prepared to make any one of three varieties of Hard Pressed Cheese, two of which must be Cheddar and Cheshire, these three to be specified on his application form, the Examiner in Cheese-making having the option of saying, during the Examination, which a candidate shall make.

8. Candidates will have the option of:—

- (a) Taking the whole Examination at one time ; or
- (b) Taking the Examination in two parts.

A candidate taking the Examination in two parts must take the following subjects at the first sitting: DAIRY HUSBANDRY, MILK AND MILK PLANT, CREAM AND BUTTER, CHEESE AND CHEESE PRODUCTS, PRACTICAL CHEESE-MAKING AND BUTTER-MAKING; the remaining three Papers, DAIRY CHEMISTRY, DAIRY MICROBIOLOGY, and DAIRY BOOK-KEEPING, at the Examination in the following year.

9. The maximum marks obtainable and the marks required for a pass in each subject are:—

WRITTEN AND ORAL EXAMINATION—		Max.	Pass.
Dairy Husbandry	(3 hours' paper)	150	90
Milk and Milk Plant	(2 hours' paper)	100	60
Cream and Butter	" "	100	60
Cheese and Cheese Products	" "	100	60
Dairy Chemistry	" "	100	60
Dairy Microbiology	" "	100	60
Dairy Book-keeping	(3 hours' paper)	100	50
PRACTICAL EXAMINATION—CHEESE-MAKING—			
(a) One of the three Hard Pressed Cheeses specified by the candidate on his form of application			
		200	150
(b) Blue-veined			
		100	75
BUTTER-MAKING			
		200	150
		<hr/>	<hr/>
		1250	815

Honours will be awarded to candidates obtaining an aggregate of 80 per cent (1000) of the maximum marks (1250) in the Examination, provided that they also obtain at least 80 per cent (360) of the maximum marks (450) in the Dairy Husbandry, Milk and Milk Plant, Cream and Butter, and Cheese and Cheese Products papers.

10. A candidate taking the whole Examination at one time:—

- (1) who fails in any part of the practical examination shall fail in the whole examination.
- (2) who fails in four or more subjects of the written examination shall fail in the whole examination.
- (3) who, having passed in the practical examination, fails in not more than three subjects of the written examination may, at the discretion of the Board, appear for those subjects in the following year.

11. A candidate taking the Examination in two parts, and failing in a single subject in the first part of the Examination, may, at the discretion of the Board, appear for that subject along with the second part ; or, in the case of a single subject of the second part, in the following year.

Failure in more than one subject will be regarded as failure in that part of the Examination. Failure in any part of the Practical Examination will entail complete failure.

12. In all cases of failure, either in the whole Examination or in part thereof, the Board will require evidence of further study before a candidate is again admitted to the Examination.

13. The entrance fees will be as follows :—

For the whole Examination taken at one time .	£3	3	0
For the Examination taken in two parts :			
First part	3	3	0
Second part	1	1	0
For reappearance, 10s. 6d. each subject.			

14. The Board reserve the right to postpone, to abandon, and to modify an Examination, and also to decline to admit any particular candidate to the Examination.

DATES OF EXAMINATIONS.

SCOTLAND.—At the Dairy School for Scotland, Auchincruive, Ayr.
Written—TUESDAY, WEDNESDAY, THURSDAY, and FRIDAY, 2nd 3rd, 4th, and 5th SEPTEMBER 1947. *Oral and Practical*—MONDAY, 15th SEPTEMBER 1947, and following days. Last date for receiving Applications, THURSDAY, 31st JULY 1947.

ENGLAND.—At the University and British Dairy Institute, Reading
 —TUESDAY, 2nd SEPTEMBER 1947, and following days. Last date for receiving Applications, MONDAY, 21st JULY 1947.

SYLLABUS OF SUBJECTS OF EXAMINATION

I.—DAIRY HUSBANDRY.

Buildings of the dairy farm ; structural features, sanitation, and water supply.

Selection, stocking, and equipment of typical dairy farms ; organisation of the dairy farm.

The utilisation of the crops of the dairy farm.

Pastures and pasture management ; dried grass, silage.

Foods used on the dairy farm ; characteristics and relative value.

Live stock of the dairy farm ; essential conformation features of the dairy cow and dairy bull ; British dairy breeds ; milk recording.

Breeding of dairy stock, principles and practice ; selection, care, and management of the sire ; calf rearing ; raising of dairy heifers.

Management of dairy herds ; self-contained herds ; attested herds.

Feeding of dairy cows for milk production ; feeding standards ; construction and use of rations.

Common ailments and diseases of dairy stock : milk fever, bloat, cow pox, mastitis, contagious abortion, tuberculosis, Johne's disease, sterility, scour, hoose, notifiable animal diseases.

Hygienic milk production ; hand and machine milking ; cleaning and care of milking machines and utensils used in milk production ; milk coolers and farm sterilising equipment.

Pigs on the dairy farm ; suitable breeds for bacon and for pork production ; housing accommodation ; breeding, feeding, and management of pigs ; fattening of pigs ; pig recording ; common ailments and diseases of pigs.

II.—MILK AND MILK PLANT.

Utilisation of milk and milk products in Great Britain ; sources of supply ; the principles of organised marketing. Milk contracts.

Properties of milk.

Variations in the composition of milk ; legal minimum standards for milk ; statutory rules and orders relating to milk and milk products.

Sources of taints and contamination in milk. Abnormal milk. Flavour in milk and the contributing factors.

Grades of milk.

Food value of milk. Hard and soft curd milk.

Transportation of milk ; milk churns ; road and rail tanks ; processing of milk at milk depots ; sampling and testing of milk ; effects of heat on milk ; essentials for efficient pasteurisation ; progressive stages in milk treatment at milk plants ; weighing ; filtering ; clarifying, pumping, pasteurising, cooling, bottling, and capping ; refrigeration ; cold storage.

Disposal of wastes from milk plants.

Distribution of milk.

Special treatment of milk ; homogenisation, irradiation, stessanisation, commercial sterilisation, high temperature, short time heat treatment.

Fermented milk preparations, Yoghurt, Kefir, and cultured butter milk.

Elementary principles of condensing and drying of milk.

III.—CREAM AND BUTTER.

Cream.—Production and consumption of cream in Great Britain. Utilisation of cream ; grades of cream, regulations for the sale of cream ; different methods of obtaining cream from milk.

Operation and management of cream separators, hand and power.

Efficiency of separation ; cleaning and sterilisation of separators.

Testing of cream.

Factors influencing the flavour, physical properties, and keeping qualities of cream ; homogenisation of cream.

Pasteurisation of cream ; cooling and storage ; marketing of cream.

Cream preparations ; whipped cream, clotted cream, sterilised cream, reconstituted cream.

Cream appliances, homogenisers, cream sterilising plant, pasteurisers, cream coolers.

Ice Cream.—Types of plant used. Materials used in, and preparation of mixes. Pasteurising, ripening, freezing, and hardening.

Butter.—*Production and consumption of butter in Great Britain ; sources of imports.*

Food value of butter ; regulations governing the production and sale of butter.

Selection and grading of cream for butter-making.

Treatment of cream prior to churning ; heating, cooling ; preparation and use of starters.

Churning of cream ; factors affecting churning and loss of butter fat.

Washing of butter ; purity of wash water.

Methods of working and salting of butter ; quality of salt.

Packing of butter and treatment of liners and butter boxes ; storage of butter ; refrigeration in factories and in transport.

Grading and judging butter. National Mark butter. Common defects in butter and their causes.

Special systems of butter-making ; sweet cream butter ; whole milk butter ; neutralised cream butter ; whey butter.

Utilisation of by-products of butter-making ; separated milk and butter milk. Casein.

Butter-making equipment ; separators ; pasteurising plant, cream coolers, cream pumps, starter-preparing apparatus, cream ripeners, churns and butter workers. Butter packers, moulders and blenders, butter cutting, and wrapping machines.

IV.—CHEESE AND CHEESE PRODUCTS.

Production and consumption of cheese in Great Britain ; sources of imports.

Food values of cheese.

Principles of cheese-making ; varieties of cheese.

Hard-pressed cheese. Agents used in manufacturing process ; starter, colour, rennet, salt.

Milk for cheese-making ; care and management.

Detailed knowledge of the manufacture of Cheddar and Cheshire, and one of the following : Derby, Dunlop, Leicester, Gloucester, or Lancashire.

Manufacture of cheese from pasteurised milk.

Small hard-pressed cheeses : Caerphilly, Smallholder, &c.

Difficulties experienced in the manufacturing process ; causes of fast and slow working, gas formation, ropy and slimy whey.

Ripening and storage of cheese.

Grading and judging of cheese ; National Mark standards.

Marketing of cheese.

Defects in the flavour, body, and texture, and in the colour of mature cheese.

Manufacture of Stilton and Wensleydale cheeses, blue-veined and white.

Soft cheese-making.

Cream cheeses. Single and double cream cheeses.

Cheese products. Manufacture of processed cheese, and cheese spreads.

Usual cheese factory equipment and arrangement ; cheese vats,

curd knives, curd agitator, cheese press, curd mill; cheese hoops, cheese turners, paraffining apparatus, pasteurising equipment, air conditioning plant.

Utilisation of whey.

V.—DAIRY CHEMISTRY.

The principal constituents of foodstuffs and the functions they fulfil. Assimilation and digestion. Vitamins.

The nature and composition of milk, colostrum, butter, cheese, cream, separated milk, butter milk, whey, casein, and lactose.

Drying and condensation of milk and milk products.

Variation in composition of milk.

Milk souring, rennet coagulation, preparation and ripening of cheese, storage of butter, salt for dairy purposes.

Metals and their influence on milk and milk products. Taints. Effects of heat on milk. Abnormal milk.

The sampling and analysis of milk and milk products. Freezing point test for milk.

Commercial routine analysis of foodstuffs.

Chemical aspects of water supply.

Dairy detergents and disinfectants.

N.B.—Candidates are required to bring to the Oral Examination in this subject their Laboratory notebooks certified by their teachers as being the record of their Laboratory work carried out during the course.

VI.—DAIRY MICROBIOLOGY.

GENERAL.—The bacteria, yeasts, and moulds which commonly occur in milk and dairy products; their form, classification (in the case of the bacteria—Topley and Wilson's), growth, and reproduction. Factors which control rate of growth. Fermentations of importance in dairying; causal micro-organisms and conditions which influence activity.

MILK.—Microbiology of milk production; sources of contamination, their relative importance and organisms derived from them. Normal changes produced by micro-organisms in milk. Abnormal changes; ropiness, premature curdling, gas formation, bitter, yeasty and malty flavours and flavour of roots and feeding-stuffs; causal organisms and methods of prevention. Effects of straining, centrifuging, cooling, heating, condensing, drying, and preservatives on the microflora of milk. Bacteriology of pasteurised and sterilised milk; influence of quality of raw milk. Standards for graded milks.

MILK PRODUCTS.—Starters; their propagation and management. Ripening of cream; development of normal flavour. Microbiology of butter. Ripening of hard, soft, and blue-veined cheese; factors concerned and their control. Microbiology of condensed, dried, and fermented milks. Defects of dairy products, causal organisms and

preventive measures ; butter defects—rancidity, yeasty and cheesy flavours, coloured spots ; cheese defects—gas formation, bitterness, slow acid development and excessive acidity, colour changes ; defects of condensed milk—gas formation, “ buttons,” coagulation.

DISEASES.—Diseases which may be conveyed by milk ; sources of infection. Bacteriology of tuberculosis, contagious abortion, mastitis, and methods of detection. Immunity ; vaccines. Disinfection.

WATER.—The importance of a pure water supply for the dairy and the herd. Bacteria commonly present in natural waters. Sources of contamination, the effect of pollution with sewage, water-borne disease.

LABORATORY WORK.—The microscope and its use. Staining (including Gram and Ziehl-Neelsen methods) and microscopic examination of micro-organisms. Methods of isolation and cultivation. Preparation of bile-salt broth, milk, milk agar, and Wilson's agar. Methods for the examination of milk ; plate method, post-pasteurisation count, coliform test, Breed's method and the methylene blue reduction, fermentation, acidity and catalase tests. Methods for tracing sources of contamination and of milk faults. Detection of thermophilic, thermoduric, and pathogenic organisms in milk. Examination of water supplies.

N.B.—Candidates are required to bring to the Oral Examination in this subject their Laboratory notebooks certified by their teachers as being the record of their Laboratory work carried out during the course.

VII.—DAIRY BOOK-KEEPING.

The interpretation of farm and dairy factory accounts and their use in farm and factory management.

General principles of double-entry book-keeping. Use of day-book, journal, ledger, cash-book, and petty-cash book. Preparation of profit and loss account, capital account, and balance-sheet. Adjustments necessary for the owner-occupier.

Analysis cash-book.

Valuations.—Bases of valuations for accounting purposes on the farm and in the dairy factory. Dates for stock-taking. Stock books and quantitative records.

Methods of accounting suitable for dairy farms with varying systems of milk disposal.

Opening and operating a bank account. Cheques, deposits, and overdrafts.

General principle of the assessment of the farmer to income tax.

WINNERS OF DIPLOMA IN 1946.**SCOTTISH CENTRE.**

(All the candidates at the Scottish Centre had been students at the Dairy School for Scotland, Auchincruive, Ayr.)

Diploma.

- JESSIE AITCHISON ANDERSON, Smeaton Shaw, Dalkeith, Midlothian.
 SHEILA DUNCAN BLACK, 578 Pollokshaws Road, Glasgow, S.1.
 JAMES RONALD ADAM BLACKWOOD, "Nethercliffe," Alva, Clackmannanshire.
 ELIZABETH BEDELL BOYD, 62 Manse Road, Bearsden, Dumbartonshire.
 JACK BRADWELL, 50 Clarel Street, Penistone, Sheffield.
 NORA BROOKS, Limehurst Farm, Waterloo, Ashton-under-Lyne, Lancs.
 NORMA ELAINE BROWNLESS, 31 Ridgewood Crescent, South Gosforth, Newcastle-on-Tyne 3.
 ANN MACNAUGHTON CAMPBELL, Boreland, Fearnan, Aberfeldy, Perthshire.
 JAMES MOIR GOLDIE, 29 Craiglhu Road, Milngavie, Dumbartonshire.
 HELEN ELIZABETH HAGGART, Laggan, Crieff, Perthshire.
 CATHERINE BOYD HOOD, 22 Emma Street, Blairgowrie, Perthshire.
 W. JEAN AINSLIE JOHNSON, 29 Alexandra Road, Reading.
 EFFIE MARGARET KITCHING, 6 Traquair Park West, Corstorphine, Edinburgh.
 THORBURN ALEXANDER THOMSON LEITCH, 22 Dean Terrace, Kilmarnock.
 ROBERT M'BRIDE, Monktonhill, Prestwick.
 MARY J. MACDONELL, Upperton, Buntait, Glen Urquhart, Invernessshire.
 DUNCAN GARNONS MACDOUGALL, Druimneil, Port Appin, Appin, Argyll.
 THOMASINA MAIRI ROSS M'GHEE, The Pheasantry, Hartley Wintney, Basingstoke, Hants.
 GEORGE WYLLIE M'HARG, Kirkland, Leswalt, Stranraer.
 CHRISTINA ALENA MACINTYRE, Ardnadrochit, Auchnacraig, Mull.
 ELSPETH MAUD MACLENNAN, 10 Sydenham Road, Glasgow, W.2.
 JEAN HUNTER MAIR, 26 Lindsay Street, Kilmarnock.
 MARJORIE SCURRAH MIDDLETON, Skelgill House, Askrigg, Leyburn, Yorks.
 MARGARET ELSPETH BLYTH NEILL, Threave, Lasswade Road, Eskbank, Midlothian.
 JEAN KIRSTY NICHOLL, Langenhoe Hall, Langenhoe, Colchester, Essex.
 ELEANOR STIRLING POWELL, 54 King's Road, Rosyth, Fife.
 MARION COPLAND SPENCE, Braefoot, Langbank, Milngavie, Dumbartonshire.
 MARY WAUGH STEELE, Blackhill Farm, Crossford, Carlisle, Lanarkshire.
 ALFRED WALSH, Paa Farm, Paythorne, Gisburn, near Clitheroe, Lancs.
 WILLIAM ARTHUR WALSH, 10 St Peter's Road, Petersfield, Hants.
 JAMES WILSON, Brockwellmuir, Dunlop, Kilmarnock,

ENGLISH CENTRE.

Diploma.

HENRY JOHN BAKER, University of Reading.
 ELISABETH ROSEMARY BROWN, Studley College.
 SYLVIA MARY BURDFIELD, University of Reading.
 SHEILA GRACE CHESHIRE, Midland Agricultural College.
 MARGARET EVA CHISLETT, University of Reading.
 ROSEMARY IMOGEN ATTERBURY CLUTTERBUCK, Studley College.
 PATRICIA JOAN CULLEY, Midland Agricultural College.
 KENNETH HENRY DEARDEN, Midland Agricultural College.
 ROSEMARY RACHEL DERBYSHIRE, University of Reading.
 ERNEST JOHANNES GLUCKSMANN, West of Scotland Agricultural College.
 MARY KATE GOLLEDGE, Midland Agricultural College.
 STELLA JOAN HARVEY, University College of Wales, Aberystwyth.
 MARY MARTIN HODDELL, University of Reading.
 NANETTE JACKSON, Midland Agricultural College.
 AUDREY JONES, University of Reading.
 RENA JONES, University College of Wales, Aberystwyth.
 MAUREEN CYNTHIA JOY, University College of Wales, Aberystwyth.
 PETER GEORGE KAUFMANN, Seale Hayne Agricultural College.
 IRENE LAMB, Midland Agricultural College.
 ELIZABETH ROBERTA ANN LANKESTER, Studley College.
 MARY TERESA LIVESEY, University of Reading.
 ROSALIND MACHIN, Midland Agricultural College.
 MOLLIE MANSFIELD, Studley College.
 BRENDA MARY ALLISON MARTIN, Midland Agricultural College.
 MARY POPPY NUTT, Studley College.
 JUDITH WYKEHAM PASSMORE, University of Reading.
 SHEILA PEEL, University of Reading.
 KATHLEEN JANET PHARAOH, Seale Hayne Agricultural College.
 JEAN ANN PICKERING, Studley College.
 BRENDA PORTEOUS, University of Reading.
 SUSAN MARGARET PRICE, University of Reading.
 BARBARA ELIZABETH PRITCHARD, University College of Wales, Aberystwyth.
 ISABEL MARGARET PYCROFT, Studley College.
 MARJORIE GLADYS SAUNDERS, University College of Wales, Aberystwyth.
 MAUDE DOROTHY SELFE, Studley College.
 MARY SIMS, University of Reading.
 VERA I. TARR, Seale Hayne Agricultural College.
 MURIEL PATRICIA WALLER, University of Reading.
 RACHEL KATHARINE WARD-SMITH, Studley College.
 ELIZABETH WIGMORE, University of Reading.
 ALICE JESSIE WISE, University of Reading.
 JEAN FERNANDES YEARDLEY, Midland Agricultural College.

EXAMINATION PAPERS OF PAST YEARS.

Copies of papers set at past Examinations in DAIRYING may be had on application. Price 1/- per set. Papers available are those for the years 1945 and 1946.

NATIONAL DAIRY EXAMINATION BOARD

NEW REGULATIONS

The National Dairy Examination Board has decided to replace the existing Diploma in Dairying (N.D.D.) by two Diplomas, the National Diploma in Dairy Husbandry (N.D.D.H.) and the National Diploma in Dairy Technology (N.D.D.T.).

The first Examinations under the new Regulations will take place in 1948.

REGULATIONS FOR EXAMINATIONS IN 1948 IN DAIRY HUSBANDRY AND DAIRY TECHNOLOGY

1. The Societies may hold annually in England and Scotland, under the management of the National Dairy Examination Board appointed by them, Examinations for the National Diplomas in Dairy Husbandry and Dairy Technology on dates and at places from time to time appointed and duly announced; the Diplomas to be distinguished shortly by the letters "N.D.D.H." and "N.D.D.T."

2. Forms of entry for Examinations in England may be obtained from The Secretary, Royal Agricultural Society of England, 16 Bedford Square, London, W.C.1, and when completed must be returned to him, with the entry fee, on or before the specified date.

3. Forms of entry for Examinations in Scotland may be obtained from The Secretary, Highland and Agricultural Society of Scotland, 8 Eglinton Crescent, Edinburgh 12, and when completed must be returned to him, with the entry fee, on or before the specified date.

4. Any candidate may enter for an Examination either in England or Scotland, but not in both in the same year.

5. As a preliminary to the acceptance of any application for permission to enter for an Examination, a candidate must produce—

(1) from the Head of an approved Dairy Training College or Institute—

- (a) A statement that the candidate is in possession of the General School Certificate (England), the Day School Certificate Higher (Scotland), or the School Certificate of the Central Welsh Board; or, in exceptional circumstances, a statement that the general education of the candidate is of an equivalent standard.
- (b) Evidence of having attended a Diploma or Degree course in the subjects of the Examination covering at least

two academic years (including practical instruction in dairy work, as stated below) at an Agricultural Department of a University, an Agricultural College or a Dairy College, and of having satisfied the authorities thereof as to fitness for admission to the Examination.

- (c) A certificate of proficiency in practical dairy work covering, for the Diploma in Dairy Husbandry—ten weeks' instruction in the handling of milk on the farm and the manufacture of farm butter and cheese, and for the Diploma in Dairy Technology—six months' instruction based principally on factory practice.
- (2) (i) In the case of entry for the Dairy Husbandry Examination a certificate of proficiency in the milking of cows, both by hand and machine, signed by a dairy farmer, and evidence of having spent a complete year, in not more than two periods, and having taken part in the work both in the dairy and on the land, on a dairy farm recommended by the training institution * and approved by the Board.
- *(It is desirable that the approved dairy farm should have a herd, mainly home-bred and milk-recorded, of not fewer than 15 cows, and be producing graded milk.)*
- (ii) In the case of entry for the Dairy Technology Examination evidence of having spent a period of not less than twelve months in a dairy factory or factories or six months in a town milk-processing plant or plants, and six months during the operating season in a country milk-processing factory or factories having manufacturing facilities, and of having acquired experience in milk processing and in the manufacture of dairy products.

6. A candidate having obtained the National Diploma in Dairy Husbandry shall be eligible to sit for the Examination in Dairy Technology provided he has attended the requisite course of instruction in the subjects of the Examination, and has spent not less than three months in a town milk-processing plant and three months during the operating season in a country milk-processing factory having manufacturing facilities.

7. A candidate having obtained the National Diploma in Dairy Technology shall be eligible to sit for the Examination in Dairy Husbandry provided he has attended the requisite course of instruction and spent not less than six months on an approved dairy farm.

8. A candidate having obtained a Degree in Agriculture at a British University or a Diploma in Agriculture recognised by the National Dairy Examination Board, shall be eligible to sit for the National Diploma in Dairy Husbandry Examination subject to the following conditions :—

- (a) that he shall have spent at least six months on an approved dairy farm ; and
- (b) shall have had one year's subsequent training in the subjects of the Examination at an approved Institution.

9. A candidate having obtained a Degree in Dairying or in Pure Science at a British University shall be eligible to sit for the National Diploma in Dairy Technology Examination subject to the following conditions :—

- (a) that he shall have spent at least six months in a dairy factory or factories, or three months in a town milk-processing plant or plants and three months during the operating season in a country milk-processing factory having manufacturing facilities and of having acquired experience in milk processing and in the manufacture of dairy products ;
- (b) shall have had not less than one year's training in the subjects of the Examination at an approved Institution.

10. Candidates desiring to enter for Examination under the provisions of Clauses 6, 7, 8, or 9 must produce evidence of having attended the courses of instruction and of having obtained the practical experience prescribed therein.

11. The subjects of the Examination, the maximum marks obtainable, and the marks required for a pass in each subject are :—

WRITTEN AND ORAL EXAMINATION.

DAIRY HUSBANDRY—		Max.	Pass.
1. Dairy Farming	(3 hours' paper)	150	90
2. Dairy Cattle—Breeding, Feeding, and Management	(3 hours' paper)	150	90
3. Physics and Chemistry	(2 hours' paper)	100	50
4. Economics and Accountancy	(3 hours' paper)	100	50
5. Dairy Microbiology	(2 hours' paper)	100	50
6. Animal Health	(2 hours' paper)	100	50
		700	380

DAIRY TECHNOLOGY—

1. Dairy Factory Buildings and Equipment	(3 hours' paper)	100	50
2. Milk Processing and Distribution and the Manufacture of Dairy Products	(3 hours' paper)	150	90
3. Organisation of the Milk Industry and Factory Management	(3 hours' paper)	150	90
4. Economics and Accountancy	(3 hours' paper)	100	50
5. Physics and Chemistry	(3 hours' paper)	100	50
6. Dairy Microbiology	(3 hours' paper)	100	50
		700	380

Oral Examinations in Dairy Husbandry may be held on a dairy farm, and in Dairy Technology at a dairy factory.

An Honours Diploma will be awarded to candidates obtaining an aggregate of 75 per cent (525) of the maximum marks in the Examination, provided that candidates for the Diploma in Dairy Husbandry obtain at least 75 per cent (225) of the maximum marks in the

Dairy Farming and Dairy Cattle papers, and candidates for the Diploma in Dairy Technology at least 75 per cent (225) of the maximum marks in the Milk Processing and Distribution and the Manufacture of Dairy Products and Organisation of the Milk Industry and Factory Management papers.

12. A candidate who fails in not more than two subjects may, at the discretion of the Board, reappear for these subjects in the following year; a candidate who fails in more than two subjects shall fail in the whole Examination. In all cases of failure and re-entry the Board will require to be satisfied with evidence of additional study in the subjects of failure as a prerequisite to re-examination.

13. The entrance fees shall be as follows :—

For the whole Examination (either Dairy Husbandry or Dairy Technology)	£5	5	0
For reappearance, £1, 1s. each subject.			

14. The Board reserves the right either to postpone or abandon or to modify an Examination as it thinks fit, and also to refuse admission to any candidate applying to take the Examination.

DATES OF EXAMINATIONS.

(To be announced later.)

NATIONAL DIPLOMA IN DAIRY HUSBANDRY

SYLLABUS OF SUBJECTS OF EXAMINATION

I.—DAIRY FARMING.

Dairy farming in relation to general agriculture ; development and distribution ; types of dairy farms ; selection, stocking, and equipment of typical dairy farms ; labour and organisation.

Buildings suitable to different conditions ; general layout ; cow-sheds, yards, and milking sheds ; milking bails ; accommodation for bulls, calves and young stocks, and fodder ; water supply ; sanitation ; requirements for graded milk production ; barn and dairy equipment.

Crops for dairy farms ; pastures and ley management ; suitable seed mixtures and costs per acre ; selection of cereal, leguminous, root, and forage crops ; acreages required and suitable rotations ; general principles of tillage, manuring, and harvesting applicable to the chief crops ; silage crops and the making of silage ; approximate costs of production of the chief crops ; grass drying.

Cost of milk production ; records which should be kept as a guide to management.

Sale of milk by wholesale and retail ; legislation affecting milk production and sale ; circumstances on the farm which affect the yield and quality of milk ; graded milk production ; payment according to composition and premiums for graded milk ; cleaning and care of milking machines and other utensils.

Pigs in relation to dairying ; suitable breeds for bacon and for pork production ; housing accommodation ; breeding, feeding, and general management.

II.—DAIRY CATTLE—BREEDING, FEEDING, AND MANAGEMENT.

Important conformation points and features of the dairy cow ; indications and measurement of production ; history of milk recording ; British methods of milk recording and fat testing.

Breeds kept for milk production ; chief characteristics and suitability for different conditions ; types of dairy herds ; home-bred herds and their advantages ; flying herds.

Principles applied to the breeding of dairy stock ; hormones in relation to breeding ; pedigree and non-pedigree stock ; herd-books and grading-up ; defects in indiscriminate crossing ; use of milk and

butter-fat records in breeding ; registers of merit and advanced registers ; progeny testing and bull indexes ; artificial insemination and its place in live-stock improvement. Selection and management of bulls.

Feeding of dairy cows ; principles and practice of feeding for maintenance and production ; feeding standards ; mineral and vitamin requirements ; chief characteristics of home-grown and purchased foods ; essentials of a good ration ; rations for winter and summer on different types of farms ; approximate costs of different rations.

Calf-rearing ; different methods ; use of foods to replace milk ; rearing and feeding of bull calves ; rearing, feeding, and management of dairy heifers ; approximate cost of rearing.

Secretion of milk ; hormones in relation to milk secretion ; milking by hand and machine ; importance of good milking.

Herd management in general ; regulation of calvings for level and seasonal production ; records essential to good herd management.

III.—PHYSICS AND CHEMISTRY.

Volumes of containers ; specific gravity ; viscosity ; surface tension ; fluid pressure ; barometers ; syphons ; pumps ; levers ; pulleys ; elementary weighing machines ; heat ; expansion ; thermometry ; conduction ; convection ; radiation ; evaporation ; latent heat ; specific heat ; calorific value ; steam, production and utilisation ; safety devices ; emulsions and their properties ; scientific principles of milking machines ; principles of refrigeration.

Elements, compounds, mixtures ; acids, bases, salts ; acidity, alkalinity ; atmosphere ; hydrogen ; oxygen ; nitrogen ; carbon ; phosphorus ; sulphur ; water ; common metals and their compounds ; metals and alloys used in dairy equipment ; elementary chemistry of alcohols, aldehydes, sugars, acetic acid, butyric acid, lactic acid, glycerol, fat, protein.

Soils, formation and classification, chemical and physical properties ; fertility and improvement of soils ; manures and manuring ; feeding stuffs and feeding standards ; composition and constituents of milk ; variation in the composition of milk ; sour milk ; cream ; butter ; separated milk ; cheese ; whey ; margarine ; dirt in milk ; legal regulations with regard to fertilisers, feeding stuffs, milk, butter, cheese, margarine ; nutritive value of dairy products ; analysis ; British Standards Institution methods of sampling and analysis ; adulteration and its detection ; detergents, disinfectants ; water supply, water softening.

N.B.—Candidates are required to bring to the Oral Examination in this subject their laboratory notebooks certified by their teachers as being the record of their laboratory work carried out during the course.

IV.—ECONOMICS AND ACCOUNTANCY.

ECONOMICS.—The Factors of Production—land, labour, capital, and enterprise—and their rewards, rent, wages, interest, and profits, Wages and Trades Boards,

Large and small-scale enterprises.

Problems and methods of marketing. The function of middlemen.
Marketing Boards.

Sources of economic and financial statistics. Problems of planning and price control.

ACCOUNTANCY.—*General Principles of Double-entry Book-keeping* : use of day book, journal, ledger, cash book, and petty cash book.

Preparation of profit and loss account, and balance sheet.

Valuations : Methods of stock-taking. Calculation of depreciation. General bases of valuations.

Income Tax : Preparation of returns—the P.A.Y.E. system for workers.

Cost Accounting : Outline of the general principles, and the chief types of records required.

V.—DAIRY MICROBIOLOGY.

GENERAL.—Form, growth, and reproduction of micro-organisms. The elements of classification. Introduction to methods of isolation, cultivation, examination, and control of micro-organisms.

MILK.—Sources of bacteria in milk. Changes produced by bacteria in milk ; souring, sweet curdling, gas formation, ropiness, taints ; causal organisms, their usual sources and methods of prevention. Taints of non-bacterial origin ; their differentiation from bacterial taints. Effects of straining, cooling, and heating on the micro-flora of milk. Raw milk as a source of fault-producing organisms in processed milk and milk products. Microbiological aspects of cleaning and sterilisation of dairy farm equipment. Standards used for grading milk.

WATER.—The importance of a pure water supply for the dairy farm. Bacteria present in natural waters. Sources of contamination ; the effect of pollution with sewage ; water-borne disease.

DISEASES.—Diseases which may be conveyed by milk ; sources of infection. Bacteriology of tuberculosis, contagious abortion, and mastitis ; methods of detection. Elements of immunity.

PRACTICAL WORK.—Microscopical examination of prepared specimens. Demonstration of methods for the sterilisation of culture media and laboratory apparatus, and for the isolation and study of micro-organisms producing faults in milk. Sampling milk ; individual cow and bulk samples. Examination of milk by the plate method, coliform test, Breed's direct microscopic method, dye reduction tests, keeping quality by taste, alcohol, and clot-on-boiling tests. Tracing sources of contamination by the use of milk samples, swab and rinse tests.

N.B.—*Candidates are required to bring to the Oral Examination in this subject their laboratory notebooks certified by their teachers as being the record of their laboratory work carried out during the course.*

VI.—ANIMAL HEALTH.

Main anatomical features of the bovine. Physiology of the bovine, with particular reference to digestion, respiration, reproduction, and milk secretion.

Infectious diseases: anthrax, foot-and-mouth disease, tuberculosis, abortion, Johne's disease. Disorders of digestive organs. Diseases associated with reproduction and with milk secretion.

Disease of young animals; rickets, scour, blackleg, parasitic diseases.

Diseases of pigs: rickets, anæmia, swine erysipelas, swine fever, parasitic disease.

Veterinary hygiene (isolation, notification, disinfection, and general prophylaxis).

Legislation (Public and Animal Health)—notifiable diseases, Milk and Dairies Order, Food and Drugs Acts, designated milk.

NATIONAL DIPLOMA IN DAIRY TECHNOLOGY

SYLLABUS OF SUBJECTS OF EXAMINATION

I.—DAIRY FACTORY BUILDINGS AND EQUIPMENT.

CONSTRUCTION AND ARRANGEMENT OF FACTORY BUILDINGS.—Selection of the site, design, and dimensions of country collecting and manufacturing plants, town pasteurising and bottling depots. Materials used in the construction of factory buildings. Lighting; ventilation; air conditioning; water supply; drainage; sewage disposal.

THE EQUIPMENT OF DAIRY FACTORIES.—Boilers and steam raising; prime movers; use of electricity; mechanical refrigeration and cold storage as used in dairy factories. Materials used in construction of dairy plant. The design and construction of plant and equipment used for transporting, receiving, processing and bottling milk, and for the manufacture of cream, butter, cheese, condensed and dried milks, ice-cream, processed cheese; casein and lactose. Precision control, thermometers and thermographs, thermostats. The layout of dairy plant and equipment for specific purposes. Methods of cleaning plant and equipment. Detergents and water softeners.

II.—MILK PROCESSING AND DISTRIBUTION AND THE MANUFACTURE OF DAIRY PRODUCTS.

MILK.—Secretion, composition, and properties. Standards, chemical and bacteriological. Grades of milk. Bacterial flora; pre-pasteurisation requirements. Principles and practice of pasteurisation and sterilisation. Bottling. Cartons. Distribution. Detection, prevention, and remedy of faults. Special treatment of milk, homogenisation, irradiation, &c.

MILK PRODUCTS.—Production of fresh, pasteurised, sterilised, clotted and plastic cream, and cream powders. Maintenance and control of starters for butter and cheese making. Manufacture of sweet, ripened, and neutralised cream butters; all British and the principal foreign varieties of hard-pressed cheese; blue-veined and soft cheese; condensed, evaporated, and dried milks; dried whey; processed cheese; casein and lactose. Manufacture of ice-cream; powders and mixes. Cold and cool air storage of butter and cheese.

Cheese ripening. Butter blending and packing. Canning of condensed and evaporated milk and the packing of dried milk under inert gas and vacuum. Factory control of quality. Faults: detection, prevention, and remedy. Grading and judging of dairy produce. Score cards. Legal and trade standards for dairy produce.

III.—ORGANISATION OF THE MILK INDUSTRY AND FACTORY MANAGEMENT.

ORGANISATION.—History of the dairy industry. Relative importance of dairying in the farming economy of Great Britain. Home production and utilisation of milk and milk products. Volume and sources of imports of dairy produce. The marketing of milk and dairy produce. Price regulation. Producers' Boards, Manufacturers' Boards and Associations, Trade Boards.

FACTORY MANAGEMENT.—The Factory and Workshops Act, Sale of Food and Drugs Act, and legislation affecting milk processing, manufacture, and relations between management and staff. Labour: engagement, control, and organisation. Factory records to cover receipts of raw materials, output of finished goods and by-products, and cost of production. Use of the laboratory to control technical efficiency.

IV.—ECONOMICS AND ACCOUNTING.

ECONOMICS.—The Factors of Production—land, labour, capital, and enterprise—and their rewards, rent, wages, interest, and profits. Wages and Trades Boards.

Large and small-scale enterprises.

Problems and methods of marketing. The function of middlemen. Marketing Boards.

Sources of economic and financial statistics. Problems of planning and price control.

ACCOUNTANCY.—*General Principles of Double-Entry Book-keeping*; use of day book, journal, ledger, cash book, and petty cash book.

Preparation of profit and loss account, and balance sheet.

Valuations: Methods of stock-taking. Calculation of depreciation. General bases of valuations.

Income Tax: Preparation of returns—the P.A.Y.E. system for workers.

Cost Accounting: Outline of the general principles, and the chief types of records required.

V.—PHYSICS AND CHEMISTRY.

Volumes of containers; specific gravity; viscosity; surface tension; fluid pressure; barometers; syphons; pumps; levers; pulleys; elementary weighing machines; heat; expansion; ther-

mometry; recording thermometers and thermographs; thermostats; conduction; convection; radiation; evaporation; latent heat; specific heat; calorific value; steam, production and utilisation; safety devices; principles of refrigeration, condensing, drying; homogenisation; irradiation; emulsions and their properties.

Elements, compounds, mixtures; acids, bases, salts; acidity, alkalinity; atmosphere; hydrogen; oxygen; nitrogen; carbon; phosphorus; sulphur; water; metals and their compounds; alcohols; aldehydes; sugars; acetic acid; butyric acid; lactic acid; glycerol; fat; protein; metals and alloys used in dairy plant.

Composition and constituents of milk, variation in the composition of milk; sour milk; cream; butter; separated milk; cheese; whey; margarine; dirt in milk; salt for dairying purposes; ice-cream; condensed milk; dried milks; dried whey; casein; influence of metal on dairy products; legal regulations with regard to milk, butter, cheese, condensed milk, dried milks, margarine; nutritive value of dairy products; analysis; British Standards Institution methods of sampling and analysis; adulteration and its detection; preservatives; detergents; disinfectants; refrigerants; water supply; water softening; dairy effluents and their chemical properties and disposal.

N.B.—Candidates are required to bring to the Oral Examination in this subject their laboratory notebooks certified by their teachers as being the record of their laboratory work carried out during the course.

VI. DAIRY MICROBIOLOGY.

GENERAL.—The bacteria yeasts and moulds which commonly occur in milk and milk products. Morphological, cultural, and physiological characters. Effect of environment on growth. Action on the individual constituents of milk; enzymes. Classification (in the case of bacteria—Topley and Wilson's).

MILK.—Microbiology of milk production; sources of contamination, their relative importance, and organisms derived from them. Changes produced by micro-organisms in milk; souring; sweet curdling; gas formation, ropiness, taints; causal organisms, and usual sources; methods of prevention. Flavours of non-bacterial origin; their differentiation from those of microbial origin. Effects of straining, cooling, heating, condensing, and drying on the microflora of milk. Standards used for grading milk. Microbiological aspects of cleaning and sterilisation of milk production and milk processing plant.

MILK PRODUCTS.—Starters for cream ripening and cheese making; their propagation and management. Microbiology of butter. Ripening of hard, soft, and blue-veined cheese; factors concerned and their control. Microbiology of condensed, dried, fermented milks, and ice-cream. Defects of milk products; causal organisms and usual sources; preventive measures. Routine laboratory control.

DISEASES.—Diseases which may be conveyed by milk ; sources of infection. Bacteriology of tuberculosis, contagious abortion, mastitis, and methods of detection. Elements of immunity.

WATER.—The importance of a pure water supply for the dairy factory and the herd. Bacteria commonly present in natural waters. Sources of contamination ; the effect of pollution with sewage, water-borne disease. Microbiological aspects of dairy effluent disposal.

PRACTICAL WORK.—The microscope and its use. Staining (including Gram and Ziehl-Neelsen methods), and microscopical examination of micro-organisms. Preparation and sterilisation of laboratory apparatus. Maintenance of incubators and water baths. Principles of media making ; preparation of nutrient broth, bile salt broth, milk, and milk agar. Isolation and study of pure cultures of common milk organisms. Methods for the examination of milk ; plate method ; coliform test. Breed's direct microscopic method, dye reduction tests, keeping quality tests, and fermentation tests. Detection of thermophilic, thermoduric, and pathogenic organisms in milk ; the phosphatase test. Methods of sampling milk ; tracing sources of contamination. Sterility tests ; rinse and swab methods. Propagation of starters ; activity and phage tests. Examination of milk products. Microbiological examination of dairy water supplies. Equipment for the microbiological laboratory.

N.B.—*Candidates are required to bring to the Oral Examination in this subject their laboratory notebooks certified by their teachers as being the record of their laboratory work carried out during the course.*

CERTIFICATES IN FORESTRY

In 1870 the Society instituted an Examination in Forestry, and granted First and Second-Class Certificates respectively to such students as attained a certain standard of proficiency in the following subjects. Candidates were required to possess a thorough acquaintance with the theory and practice of Forestry, and a general knowledge of the following branches of study, so far as these applied to Forestry: (a) the elements of Forest Botany and Forest Zoology; (b) the elements of Meteorology and Geology; (c) Forest Engineering; and (d) Arithmetic and Book-keeping.

Holders of the First-Class Certificate were entitled to become free Life Members of the Society.

In view of the institution of Examinations for Certificates and Diplomas in Forestry by the Royal Scottish Forestry Society, and by arrangement with that Society, the Board of Directors of the Highland and Agricultural Society of Scotland resolved in 1935 to cease holding further Examinations for the First and Second-Class Certificates, and that, in future, the granting of Certificates and Diplomas be left in the hands of the Royal Scottish Forestry Society.

The list of students who obtained the Highland and Agricultural Society's Certificates in Forestry prior to 1899 appears in the 'Transactions' for the year 1899. A further list of those obtaining Certificates between 1899 and 1935 inclusive appears in the 'Transactions' for the year 1935. The total number of Certificates granted since the commencement of the Examination in 1870 was as follows: First-Class, 43; Second-Class, 38.

VETERINARY CERTIFICATES AND MEDALS

The Society established a Veterinary Department in 1823, but by an arrangement made with the Royal College of Veterinary Surgeons, the Society's examination ceased in 1881. Holders of the Society's Veterinary Certificate are entitled to become members of the Royal College of Veterinary Surgeons on payment of certain fees, without being required to undergo any further examination. The number of students who passed for the Society's Certificate is 1183.

The Society gives annually a limited number of silver medals for Class competition to each of the two Veterinary Colleges in Scotland—the Royal (Dick) Veterinary College, Edinburgh, and the Glasgow Veterinary College, Glasgow.

CHEMICAL DEPARTMENT

PRICES OF FERTILISERS AND FEEDING-STUFFS— SEASON 1947.

(Cash Prices as at 5th February. These prices are subject to variation from month to month or oftener.)

FERTILISERS.

Name of Fertiliser.	Guarantee.	Price per Ton.	Price per Unit.
Superphosphate *	18% Sol. Phos. Acid	£ s. d. 5 14 6	s. d. 6 4½
(March-June)	20.6% Nitrogen	5 16 0	6 5½
Sulphate of Ammonia (neutral) *	12% Total Phos. Acid	10 1 6	9 9½
(March-June)	13% Total Phos. Acid	10 3 0	9 10½
Basic Slag *†	14% Total Phos. Acid	2 18 6	4 5½
" " *†	15.3% Total Phos. Acid.	2 16 6	4 4
" " *† (Bessemer).	25% Total Phos. Acid	2 19 6	4 3
North African Ground Mineral Phosphate *†	4% Nitrogen	3 12 6	8 11½
" " *†	20% Total Phos. Acid	5 2 0	4 1
Bone Meal (Imported)	16% Nitrogen	26 10 0	N 58 11 TPA 14 8½
Chilean Nitrate of Soda *	15% Nitrogen		
Chilean Potash Nitrate *	15% Potash	15 16 0	N 14 0½ P 7 0½
" Nitro Chalk " *	15.5% Nitrogen		
Sulphate of Potash	48.5% Potash	9 16 0	12 7½
Muriate of Potash	60% Potash	18 15 0	7 8½
		13 13 0	4 6½

The prices for all fertilisers are cash prices for two-ton lots in bags at Leith or Glasgow, unless otherwise stated. Where prices are quoted carriage paid, there is a reduction, in certain cases, of from 5/- to 10/- per ton when lifted Ex Sellers' stores.

* Carriage paid to any railway station in six-ton lots. Four-ton lots 2/6 more per ton.

† The fineness is such that 80% of the powder will pass through the prescribed sieve.

‡ The fineness is such that 90% of the powder will pass through the prescribed sieve. 85% solubility in citric acid.

N.B.—When these units are multiplied by the percentages in the analysis of a Manure, they will produce a value representing very nearly the cash price per ton at which Fertilisers may be bought in fine sowing condition at Leith.

Shell Lime (85% calcium oxide), at Greenleighton, 37/7 per ton; (70% calcium oxide), at Loanhead (Shotts), 41/9 per ton; at Esperston, Gorebridge, 41/- per ton; at Middleton, Gorebridge, 41/5 per ton.

Ground Lime, in bags (60% calcium oxide), at Dufftown, 58/8 per ton; (60% calcium oxide), at Loanhead (Shotts), 59/8 per ton; (70% calcium oxide), at Middleton, Gorebridge, 58/6 per ton.

English Ground Lime (75% calcium oxide), at Greenleighton, 54/7 per ton.

Ground Limestone (94% calcium carbonate), at Loanhead (Shotts), 29/- per ton; (90% calcium carbonate), at Grange, 25/6 per ton; (90% calcium carbonate), at Middleton, Gorebridge, 28/- per ton; (96% calcium carbonate), at Saltoun, 28/- per ton; (75% calcium carbonate), at Kirkmichael, 28/6 per ton.

FEEDING-STUFFS.

Name of Feeding-Stuff.	Price per Ton.
	£ s. d.
Linseed Cake (Home), 8% Oil, 28% Albuminoids	11 5 0
" (Expeller), 18% Oil, 38% Albuminoids	11 19 6
Cotton Seed Cake (Egyptian) (undecorticated) (home made), 4.5% Oil, 22% Albuminoids	7 17 6
Decorticated Cotton Seed Cake, 48-50% Oil and Albuminoids	10 2 6
Ground Nut Meal, Extracted, 55% Oil and Albuminoids	10 0 0
Ground Nut Cake, Decorticated (Expeller), 57-60% Oil and Albuminoids	9 17 6
Palm Kernel Cake	8 5 0
Rice Bran Meal	8 5 0
Wheat Feed (Bran), straight run	8 17 6
Dried Grains †	7 7 6
{ From	8 17 6
{ To	9 12 6
Locust Beans (Kibbled) †	10 0 0
Maize †	10 0 0
" (Flaked) †	12 5 0
Home Oats (Feeding)	16 0 0
White Fish Meal, 4% Oil, 64% Albuminoids (at Aberdeen)	23 14 8

All the above are controlled prices and are for one-ton lots direct ex import quay or mill, unless otherwise stated.

† Including Bags.

‡ Bags extra.

CLASSIFICATION OF MANURES.

BONE MEALS	{ Genuine Bone Meal contains about 20 per cent Phosphoric Acid equal to 48.7 per cent Tricalcium Phosphate, and about 4 per cent Nitrogen. If Phosphates are low, Nitrogen will be high, and conversely.
MIXTURES AND COMPOUND MANURES	{ To be valued according to the following units: Nitrogen, 9/10; Soluble Phosphoric Acid, 5/9½; Insoluble Phosphoric Acid, 8/5; and Potash, 4/11 (from muriate). The value so arrived at will be the value at Leith, exclusive of the cost of mixing, bags and bagging, which may be taken on an average at about 30/- per ton.

INSTRUCTIONS FOR VALUING MANURES.

The unit used for the valuation of manures is the hundredth part of a ton, and as the results of analyses of manures are expressed in parts per hundred, the percentage of any ingredient of a manure when multiplied by the price of the unit of that ingredient represents the value of the quantity of it contained in a ton.

As an example take muriate of potash; a good sample (see p. 52) will be guaranteed to contain 60 per cent of oxide of potash. All potash manures are valued according to the amount of potash (oxide of potash) they yield, and muriate of potash yields 60 per cent of potash (K_2O)—i.e., 60 units per ton; and as a ton of muriate of potash costs £13, 13s., the price of the unit is the sixtieth part of that—viz., $4/6\frac{1}{2}$. If on analysis a sample of muriate of potash guaranteed to contain 60 per cent of potash is found to contain only 56 per cent, the price per ton will be $18/3$ (four times $4/6\frac{1}{2}$) less—viz., £12, 14s. 10d.

Similarly with all other manures, the price per unit is derived from the price per ton of a sample of good material up to its guarantee, and

therefore the proper price per ton of a manure is found by multiplying the price of the unit of the valuable ingredient by the percentage as found by analysis. If a manure contains more than one valuable ingredient, the unit value of each ingredient is multiplied by its percentage, and the values so found when added together give approximately the price per ton of the manure.

The commercial values of manures are determined by means of the Units in the following manner:—

Take the results of analysis of the manure, and look for the following substances:—

Phosphates dissolved (or soluble phosphoric acid)	}	No other items but these are to be valued.
Phosphates undissolved (or insoluble phosphoric acid)		
Total phosphoric acid		
Nitrogen		
Potash		

Should the results of analysis or the guarantee not be expressed in that way, the chemist or the seller should be asked to state the quantities in these terms.

Suppose the manure is a superphosphate. The February price per unit of phosphoric acid in superphosphate (18 per cent grade) is $6/4\frac{1}{2}$, and if a consignment contains 17 per cent soluble phosphoric acid it is valued thus—

Soluble phosphoric acid. 17 times $6/4\frac{1}{2}$, equal to £5, 8s. 0d.

Insoluble phosphoric acid is not valued in a superphosphate.

Suppose the manure is a compound fertiliser containing 6 per cent nitrogen, 8 per cent soluble phosphoric acid, 1 per cent insoluble phosphoric acid, and 5 per cent potash. From the units given on p. 53 for "Mixtures and Compound Manures," the value of this compound fertiliser is obtained as follows:—

The value of the—

Nitrogen will be	£2	19	0	per ton
Soluble phosphoric acid will be	2	6	4	"
Insoluble phosphoric acid will be	0	3	5	"
Potash will be	1	4	7	"

£6 13 4

The value of this manure will thus be £6, 13s. 4d. per ton, exclusive of the cost of mixing, bags and bagging, which may be taken on an average at about 30/- per ton. It will be seen that the potash is valued on the assumption that it is derived from muriate.

Note.—The units have reference solely to the MARKET PRICES of MANURES, and not to their AGRICULTURAL VALUES.

TABLE OF COMPENSATION VALUES FOR 1947.

TABLE SHOWING THE VALUE OF FEEDING-STUFFS AS MANURE PER TON, AND THE COMPENSATION VALUE PER TON OF FOOD CONSUMED, BASED ON THE AVERAGE UNIT PRICES OF FERTILISERS FOR 1947.

The following is a Table showing (under Section A) the average proportions of nitrogen, phosphoric acid, and potash present in the feeding-stuffs named. The Table also shows the value per unit of nitrogen, phosphoric acid, and potash, the prices per unit being the value per unit for compound manures prevailing for 1947. Under Section B of the Table is shown the compensation value per ton of food consumed for each of the feeding-stuffs named, based on the unit prices for 1947. Column (1) of Section B of the Table shows the value per ton recovered in dung; while the remaining two columns show the residual values per ton after one crop and two crops have been removed.

The residual value, after one crop has been removed, is taken as one-half of the original residual value. Residual values, after one crop has been removed, are reduced by one-half after each crop.

Foods.	Nitrogen.		
	Per cent in food.	Value at 9s. 10d. per unit.	Two-fifths value to manure.
	(1)	(2)	(3)
Cotton-cake, decorticated	6.90	s. d. 67 10	s. d. 27 2
Cotton-cake, undecorticated	3.54	34 10	13 11
Linseed-cake	4.75	46 9	18 8
Linseed	3.60	35 5	14 2
Soya-bean cake	6.85	67 4	26 11
Palm-nut cake	2.50	24 7	9 10
Cocoa-nut cake	3.40	33 5	13 4
Earth-nut cake	7.62	74 11	30 0
Rape cake	4.90	48 2	19 3
Beans	4.00	39 4	15 9
Peas	3.60	35 5	14 2
Wheat	1.80	17 8	7 1
Barley	1.65	16 3	6 6
Oats	2.00	19 8	7 10
Maize	1.70	16 9	6 8
Rice-meal	1.90	18 8	7 6
Locust beans	1.20	11 10	4 9
Malt	1.70	16 9	6 8
Malt culms	3.90	38 4	15 4
Bran	2.50	24 7	9 10
Brewers' and distillers' grains (dried)	3.30	32 5	13 0
Brewers' and distillers' grains (wet)	0.81	8 0	3 2
Dried distillery dreg	5.31	52 3	20 11
Clover hay	2.24	22 0	8 10
Meadow hay	1.50	14 9	5 11
Wheat straw	0.45	4 5	1 9
Barley straw	0.40	3 11	1 7
Oat straw	0.50	4 11	2 0
Mangolds	0.22	2 2	0 10
Swedes	0.25	2 6	1 0
Turnips	0.18	1 9	0 8
Fish-meal	8.98	88 4	35 4

The figures in column (10) are the

A. VALUE PER TON AS MANURE.						B. COMPENSATION VALUE PER TON OF FOOD CONSUMED.		
Phosphoric Acid.			Potash.			(1) Value re- covered in dung.	Residual Value after	
Per cent in food.	Value at 5s. 9d. per unit.	Three- fourths value to manure.	Per cent in food.	Value at 4s. 11d. per unit.	Three- fourths value to manure.	(10)	(2) One crop.	(3) Two crops.
(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	s. d.	s. d.		s. d.	s. d.	s. d.	s. d.	s. d.
3.10	17 10	13 5	2.00	9 10	7 5	48 0	24 0	12 0
2.00	11 6	8 8	2.00	9 10	7 5	30 0	15 0	7 6
2.00	11 6	8 8	1.40	6 11	5 2	32 6	16 3	8 2
1.54	8 10	6 8	1.37	6 9	5 1	25 11	13 0	6 6
1.30	7 6	5 8	2.20	10 10	8 2	40 9	20 5	10 2
1.20	6 11	5 2	0.50	2 6	1 11	16 11	8 6	4 3
1.40	8 1	6 1	2.00	9 10	7 5	26 10	13 5	6 9
2.00	11 6	8 8	1.50	7 5	5 7	44 3	22 2	11 1
2.50	14 5	10 10	1.50	7 5	5 7	35 8	17 10	8 11
1.10	6 4	4 9	1.30	6 5	4 10	25 4	12 8	6 4
0.85	4 11	3 8	0.96	4 9	3 7	21 5	10 9	5 4
0.85	4 11	3 8	0.53	2 7	1 11	12 8	6 4	3 2
0.75	4 4	3 3	0.55	2 8	2 0	11 9	5 11	2 11
0.60	3 5	2 7	0.50	2 6	1 11	12 4	6 2	3 1
0.60	3 5	2 7	0.37	1 10	1 5	10 8	5 4	2 8
0.60	3 5	2 7	0.37	1 10	1 5	11 6	5 9	2 11
0.80	4 7	3 5	0.80	3 11	2 11	11 1	5 7	2 9
0.80	4 7	3 5	0.60	2 11	2 2	12 3	6 2	3 1
2.00	11 6	8 8	2.00	9 10	7 5	31 5	15 9	7 10
2.70	15 6	11 8	1.45	7 2	5 5	26 11	13 6	6 9
1.61	9 3	6 11	0.20	1 0	0 9	20 8	10 4	5 2
0.42	2 5	1 10	0.05	0 3	0 2	5 2	2 7	1 4
0.44	2 6	1 11	0.22	1 1	0 10	23 8	11 10	5 11
0.57	3 3	2 5	1.50	7 5	5 7	16 10	8 5	4 3
0.40	2 4	1 9	1.60	7 10	5 11	13 7	6 10	3 5
0.24	1 5	1 1	0.80	3 11	2 11	5 9	2 11	1 5
0.18	1 0	0 9	1.00	4 11	3 8	6 0	3 0	1 6
0.24	1 5	1 1	1.00	4 11	3 8	6 9	3 5	1 8
0.07	0 5	0 4	0.40	2 0	1 6	2 8	1 4	0 8
0.06	0 4	0 3	0.22	1 1	0 10	2 1	1 1	0 6
0.05	0 3	0 2	0.30	1 6	1 2	2 0	1 0	0 6
7.24	41 8	31 3	0.50	2 6	1 11	68 6	34 3	17 2

ENTOMOLOGICAL DEPARTMENT

Consulting Zoologist to the Society—A. E. CAMERON, M.A., D.Sc.,
Department of Agricultural and Forest Zoology, University of
Edinburgh, 10 George Square, Edinburgh.

REPORTS ON THE ANIMAL ENEMIES OF CROP PLANTS AND LIVE STOCK (INCLUDING POULTRY).

The Consulting Zoologist is prepared to send to any Member of the Society a Report on damage to, or diseases of, plants and animals due to animal agency (Insects, Mites, Worms, Snails, Slugs, Birds, and the Smaller Mammals), and will advise Members regarding insects or allied animals which, in any stage of their development, infest—

- | | |
|-----------------------------------|-------------------------------------|
| (a) Farm crops. | (d) Fruit and fruit trees. |
| (b) Stored grain and foodstuffs. | (e) Forest trees and stored timber. |
| (c) Garden and greenhouse plants. | (f) Live stock (including poultry). |

Any Member consulting Dr Cameron should give him full particulars of the damage or disease upon which his advice is desired. In addition, there should be sent to him specimens of the injured plants, or the injured parts of plants, &c., as well as specimens of the insects or animals believed to be the cause of the injury.

Specimens should be sent in tin or wooden boxes, or in quills, in order to prevent injury in transmission.

The Directors have fixed the fee payable by Members to Dr Cameron at 2s. 6d. for each case upon which he is consulted : this fee should be sent to him along with the application for information.

Letters and parcels (carriage or postage paid) should be addressed to A. E. Cameron, Esq., M.A., D.Sc., Department of Agricultural and Forest Zoology, University of Edinburgh, 10 George Square, Edinburgh.

BOTANICAL DEPARTMENT

Consulting Botanist to the Society—(vacant).

The Society has fixed the following scale of charges for the examination of plants and seeds for the *bona fide* and individual use and information of members of the Society (not being seedsmen), who are particularly requested, when applying to the Consulting Botanist, to mention the kind of examination required, and to quote its number as appearing in the undernoted Scale of Charges. The charge for examination must be paid at the time of application, and the carriage or postage on all parcels must be prepaid.

Scale of Charges for Examinations.

1. A report on the purity, amount, and nature of foreign materials, and the germinating power of a sample of seed 1s.
2. Determination of the species of any weed or other plant, or of any vegetable parasite, with a report on its habits and the means for its extermination or prevention 1s.
3. Report on any disease affecting farm crops 1s.
4. Determination of the species of any natural grass or fodder plant, with a report on its habits and pasture or feeding value 1s.

The Consulting Botanist's Reports are furnished to enable members—purchasers of seeds and corn for agricultural or horticultural purposes—to test the value of what they buy, and are not to be used or made available for advertising or trade purposes by seedsmen or otherwise.

Purchase of Seeds.

The purchaser should obtain from the vendor, by invoice or other writing, the proper designation of the seeds bought, with a guarantee of the percentage of purity and germination, and of its freedom from ergot, and in the case of clover, from the seeds of dodder or broomrape.

It is strongly recommended that the purchase of *prepared mixtures* of seeds should be avoided. The different seeds should be purchased separately and mixed by the farmer: mixtures cannot be tested for germination.

The Sampling of Seeds.

The utmost care should be taken to secure a fair and honest sample. This should be drawn from the bulk delivered to the purchaser, and not from the sample sent by the vendor.

When legal evidence is required, the sample should be taken from the bulk, and placed in a sealed bag in the presence of a witness. Care should be taken that the sample and bulk be not tampered with after delivery, or mixed or brought in contact with any other sample or bulk.

At least one ounce of grass and other small seeds should be sent, and two ounces of cereals and the larger seeds. When the bulk is obviously impure the sample should be at least double the amount specified. Grass seeds should be sent at least four weeks, and seeds of clover and cereals two weeks, before they are to be used.

The exact name under which the sample has been sold and purchased should accompany it.

Reporting the Results.

The Report will be made on a schedule in which the nature and amount of impurities will be stated, and the number of days each sample has been under test, with the percentage of the seeds which have germinated.

"Hard" clover seeds, though not germinating within the time stated, will be considered good seeds, and their percentage separately stated.

The impurities in the sample, including the chaff of the species tested, will be specified in the schedule, and only the percentage of the pure seed of that species will be reported upon; but the REAL VALUE of the sample will be stated. The Real Value is the combined percentages of purity and germination, and is obtained by multiplying these percentages and dividing by 100: thus in a sample of Meadow Fescue having 88 per cent purity and 95 per cent germination, 88 multiplied by 95 gives 8360, and this divided by 100 gives 83·6, the Real Value.

Selecting Specimens of Plants.

The whole plant should be taken up and the earth shaken from the roots. If possible the plants should be in flower or fruit. They must be packed in a light box, or in a firm paper parcel.

Specimens of diseased plants or of parasites should be forwarded as fresh as possible. They must be placed in a bottle, or packed in tinfoil or oil-silk.

All specimens should be accompanied with a letter specifying the nature of the information required, and stating any local circumstances (soil, situation, &c.) which, in the opinion of the sender, would be likely to throw light on the inquiry.

NOTE.—Members are reminded that Seeds may now be tested at the Department of Agriculture for Scotland Seed-testing Station. Samples should be addressed to the Seed-testing Station, East Craigs, Corstorphine, Edinburgh.

PREMIUMS OFFERED

1947

GROUP I.—REPORTS.

GENERAL REGULATIONS.

1. It is to be distinctly understood that the Society is not responsible for the views, statements, or opinions of any of the writers whose papers are published in the 'Transactions.'

2. All reports must be legibly written, and on one side of the paper only; they must specify the number and subject of the Premium for which they are in competition; they must bear a distinguishing motto, and be accompanied by a sealed letter, similarly marked, containing the name and address of the reporter—initials must not be used.

3. No sealed letter, unless belonging to a report found entitled to the Premium offered, or a portion of it, will be opened without the author's consent.

4. Reports for which a Premium, or a portion of a Premium, has been awarded, become the property of the Society, and cannot be published in whole or in part, or circulated in any manner, without the consent of the Directors. All other papers will be returned to the authors if applied for within twelve months.

5. The Society is not bound to award the whole or any part of a Premium.

6. All reports must be of a practical character, containing the results of the writer's own observation or experiment, and the special conditions attached to each Premium must be strictly fulfilled. General essays, and papers compiled from books, will not be rewarded or accepted. Weights and measurements must be indicated by the imperial standards.

7. The Directors, before or after awarding a Premium, shall have power to require the writer of any report to verify the statements made in it.

8. The decisions of the Board of Directors are final and conclusive as to all matters relating to Premiums, whether for Reports or at General or District Shows; and it shall not be competent to raise any question or appeal touching such decisions before any other tribunal.

9. The Directors will welcome papers from any Contributor on any suitable subject, whether included in the Premium List or not; and if the topic and the treatment of it are both approved, the writer may be remunerated and his paper published.

SECTION 1.—THE SCIENCE AND PRACTICE OF AGRICULTURE.

FOR APPROVED REPORTS.

1. On any useful practice in Rural Economy adopted in other countries, and susceptible of being introduced with advantage into Scotland—The Gold Medal. To be lodged by 1st November in any year.

The purpose chiefly contemplated by the offer of this premium is to induce travellers to notice and record such particular practices as may seem calculated to benefit Scotland. The Report to be founded on personal observation.

2. Approved Reports on other suitable subjects. To be lodged by 1st November in any year.

SECTION 2.—ESTATE IMPROVEMENTS.

FOR APPROVED REPORTS.

1. By the Proprietor in Scotland who shall have executed the most judicious, successful, and extensive Improvement—The Gold Medal, or Ten Pounds. To be lodged by 1st November in any year.

Should the successful Report be written for the Proprietor by his resident factor or farm manager, a Minor Gold Medal will be awarded to the writer in addition to the Gold Medal to the Proprietor.

The merits of the Report will not be determined so much by the mere extent of the improvements, as by their character and relation to the size of the property. The improvements may comprise reclaiming, draining, enclosing, planting, road-making, building, and all other operations proper to landed estates. The period within which the operations may have been conducted is not limited, except that it must not exceed the term of the Reporter's proprietorship.

2. By the Proprietor or Tenant in Scotland who shall have reclaimed within the ten preceding years not less than forty

acres of Waste Land—The Gold Medal, or Ten Pounds. To be lodged by 1st November in any year.

3. By the Tenant in Scotland who shall have reclaimed within the ten preceding years not less than twenty acres of Waste Land—The Gold Medal, or Ten Pounds. To be lodged by 1st November in any year.

4. By the Tenant in Scotland who shall have reclaimed not less than ten acres within a similar period—The Medium Gold Medal, or Five Pounds. To be lodged by 1st November in any year.

The Reports in competition for Nos. 2, 3, and 4 may comprehend such general observations on the improvement of waste lands as the writer's experience may lead him to make, but must refer especially to the lands reclaimed—to the nature of the soil—the previous state and probable value of the subject—the obstacles opposed to its improvement—the details of the various operations—the mode of cultivation adopted—and the produce and value of the crops produced. As the required extent cannot be made up of different patches of land, the improvement must have relation to one subject; it must be of profitable character, and a rotation of crops must have been concluded before the date of the Report. *A detailed statement of the expenditure and return* and a certified measurement of the ground are requisite.

5. By the Proprietor or Tenant in Scotland who shall have improved within the ten preceding years the Pasturage of not less than thirty acres, by means of top-dressing, draining, or otherwise, without tillage, in situations where tillage may be inexpedient—The Gold Medal, or Ten pounds. To be lodged by 1st November in any year.

6. By the Tenant in Scotland who shall have improved not less than ten acres within a similar period—The Minor Gold Medal. To be lodged by 1st November in any year.

Reports in competition for Nos. 5 and 6 must state the particular mode of management adopted, the substances applied, the elevation and nature of the soil, its previous natural products, and the changes produced.

SECTION 3.—HIGHLAND INDUSTRIES.

FOR APPROVED REPORTS.

1. The best mode of treating native Wool; cleaning, carding, dyeing, spinning, knitting, and weaving by hand in the Highlands and Islands of Scotland—Five Pounds. To be lodged by 1st November in any year.

SECTION 4.—MACHINERY.**FOR APPROVED REPORTS.**

To be lodged by 1st November in any year.

SECTION 5.—FORESTRY.**FOR APPROVED REPORTS.**

1. On Plantations of not less than eight years' standing formed on deep peat-bog—The Medium Gold Medal, or Five Pounds. To be lodged by 1st November in any year.

The Premium is strictly applicable to deep peat or flow moss; the condition of the moss previous to planting, as well as at the date of the Report, should, if possible, be stated.

The Report must describe the mode and extent of the drainage, and the effect it has had in subsiding the moss—the trenching, levelling, or other preliminary operations that may have been performed on the surface—the mode of planting—kinds, sizes, and number of trees planted per acre—and their relative progress and value, as compared with plantations of a similar age and description grown on other soils in the vicinity.

GROUP II.—DISTRICT GRANTS.

APPLICATIONS.

Forms of Application may be obtained from the Secretary, 8 Eglinton Crescent, Edinburgh 12, which should be completed and returned on or before **1st November 1947**, in respect of a Grant commencing in the following year.

RENEWAL OF GRANT.—Applications for **renewal** of a particular Grant will be entertained only after the lapse of a specified interval of years (as undernoted) from the termination of the previous Grant, without prejudice, however, to the competency of applying in such intermediate years for a Grant in any other class.

Class.	Interval.
1. Grants of £12 for Show Premiums for Horses, Cattle, Sheep, and Pigs	4 years.
2. Grants of £15 in respect of Stallions engaged for Agricultural purposes	3 years.
3. Grants of Silver Medals in aid of Premiums	2 years.
4. Special Grants	—
5. Grants of £10 to Federations of S.W.R.I. for Show or Exhibition Prizes	2 years.

CLASS 1.

LOCAL AGRICULTURAL SOCIETIES—GRANTS OF £12 FOR SHOW PREMIUMS FOR HORSES, CATTLE, SHEEP, AND PIGS.

REGULATIONS, 1947.

1. **CLASS OF STOCK—LIMIT OF GRANTS, £340.**—The Highland and Agricultural Society will make Grants to Local Societies for Prizes for *Breeding Animals* in any of the following classes of Stock, viz. :—

Cattle.

Shorthorn.
Aberdeen-Angus.
Galloway.
Belted Galloway.
Highland.
Ayrshire.
British Friesian.
Red Poll.
Jersey.
Shetland.

Horses.

Draught Horses.
Hunters.
Hackneys.
Ponies.
Shetland Ponies.

Sheep.

Blackface.
Cheviot.
Border-Leicester.
Half-Bred.
Shropshire.
Oxford Down.
Suffolk.
Wensleydale.

Pigs.

Any Pure Breed.

Cross-bred ¹ animals are not eligible. The Prizes must be confined to *Breeding Animals*; "bullocks," "geldings," "wethers," and "hog pigs" are excluded.

¹ *Exceptions to this rule may, however, be authorized by the Board of Directors, on application. The Directors are prepared to consider applications from Local Societies which desire to use their Grants, or part thereof, as prizes for cross-bred calves and one-year-old cross-bred cattle.*

2. All Competitions must be at the instance of a local Society. A Committee of Management shall be appointed, and either the Convener of the Committee or the Secretary of the Society must be a Member of the Highland and Agricultural Society of Scotland.

3. GRANT TO SOCIETY, £12.—The portion of the Grant to any one local Society shall not exceed the sum of £12 in any one year.

4. ALLOCATION OF GRANT.—The Grant from the Highland and Agricultural Society shall not be applied as a Grant in aid of the Premiums offered by the local Society, but must be offered in the form of separate Prizes for the animals chosen; and the offer of the Prizes must be announced in the Premium List and Catalogue of the Show as “presented by the Highland and Agricultural Society of Scotland.”

5. CONTINUANCE OF GRANT—THREE YEARS.—The Money Grant shall continue for three alternate years, provided always that the local Society shall, in the two intermediate years, continue the Competition by offering Premiums for the same class of Stock as that selected in each previous year to compete for the Highland and Agricultural Society's Prizes.

If no Competition takes place for two consecutive years the Grant expires.

6. MEDALS IN INTERMEDIATE YEARS.—In the two intermediate years the Highland and Agricultural Society will place three Silver Medals at the disposal of each local Society, for the same classes of Stock as those for which the Money Premiums are offered, provided that not less than three lots are exhibited in the same class.

7. When it is agreed to hold the General Show of the Society in any one of the Show Divisions, no local Society may hold a Show within that Division in the three months immediately preceding the date of the General Show. In the event of a Show being held, the entire Grant to the local Society will be cancelled.

8. RULES OF COMPETITION.—The Rules of Competition for the Premiums, the funds for which are derived from Grants of the Highland and Agricultural Society, shall be such as are generally enforced by the local Society in the case of Premiums offered from its own funds.

9. AREA AND PARISHES—FIVE PARISHES.—When making application for Grants from the Highland and Agricultural Society, the local Society must delineate the area and the number of parishes comprised in the district, and, *except in special cases*, no local Society shall be entitled to a Grant whose Show is not open to at least five parishes.

10. REPORTS.—Forms of Report will be furnished to the Secretaries of local Societies. Detailed Reports of the Competitions for the Society's Premiums must be given and the completed Reports, duly signed and certified, must be lodged with the Secretary of the Highland and Agricultural Society as soon as possible after the Show, and in no case later than **1st November**. These Reports are subject to the approval of the Directors of the Highland and Agricultural Society, against whose decision there shall be no appeal. **The Grant will lapse if no Report is lodged by the due date.**

11. GRANTS—WHEN PAID.—The Grants made to local Societies will be paid in December after the Reports of the awards of the Prizes have been received and found to be in order and passed by

the Board of Directors, the Money Grants being paid to the Secretaries of the local Societies and the Medals sent direct to the winners. *The Secretary of the local Society must not on any condition whatever pay any Premium offered by the Highland and Agricultural Society until he has been informed that the awards are in order and has received the Grant from the Highland and Agricultural Society.*

12. RENEWAL OF GRANT.—No application for renewal of a Grant to a local Society will be entertained until after the expiry of four years from the termination of the last Grant.

13. DISPOSAL OF APPLICATIONS.—In disposing of applications for District Grants, the Directors of the Highland and Agricultural Society shall keep in view the length of interval that has elapsed since the expiration of the last Grant, giving priority to those local Societies which have been longest off the list.

Grants in 1947.

5th and Final Year—GRANT OF £12.

1. GLENKENS AGRICULTURAL SOCIETY.

Convener—Sir Andrew Agnew, C.B.E., Glenlee Park, New Galloway, Castle Douglas.

Secretary—Andrew Robb, Mains of Kenmure, New Galloway, Castle Douglas.

Granted 1936. (Grants in abeyance 1939-45—on account of the war.)

2. ISLAY, JURA, AND COLONSAY AGRICULTURAL ASSOCIATION.

Convener—John H. Cranston, Eallabus, Islay.

Secretary—W. G. Lackie, Redhouses, Bridgend, Islay.

Granted 1936. (Grants in abeyance 1940-46—on account of the war.)

3. KILLEARN AGRICULTURAL SOCIETY.

Convener—John M'Queen, Laigh Finnich Farm, Drymen Station.

Secretary—William Allan, Dalnair Cottage, Drymen Station.

Granted 1937. (Grants in abeyance 1940-45—on account of the war.)

4. KILMACOLM AND PORT-GLASGOW AGRICULTURAL SOCIETY.

Convener—Nigel Laird, Torridon, Kilmacolm.

Secretary—James Ferguson, Royal Bank of Scotland, Kilmacolm.

Granted 1937. (Grants in abeyance 1940-45—on account of the war.)

5. STRATHENDRICK AGRICULTURAL SOCIETY.

Convener—J. M. Bannerman, Old Manse, Balmaha, Drymen.

Secretary—A. H. Jessiman, Waverley, Balfon, Stirlingshire.

Granted 1936. (Grant in abeyance 1937—on account of Alloa Show; in 1940-45—on account of the war.)

6. YARROW AND ETTRICK PASTORAL SOCIETY.

Convener—W. D. Barrie, Sundhope, Yarrow.*Secretary*—John A. Wylie, The British Linen Bank, Selkirk.

Granted 1936. (Grants in abeyance 1939-45—on account of the war.)

4th (Intermediate) Year—3 SILVER MEDALS.

7. CUMBERNAULD AGRICULTURAL SOCIETY.

Convener—Walter Duncan, Wester Dullatur, Dullatur, Dumbartonshire.*Secretary*—A. Elrick Gray, Cumbernauld Estate Office, Dullatur, Dumbartonshire.

Granted 1938. (Grants in abeyance 1940-45—on account of the war.)

8. DENNY AND DUNIPACE AGRICULTURAL ASSOCIATION.

Convener—William Muirhead, Foot o' Green, Bannockburn, by Stirling.*Secretary*—Major A. Forbes Hendry, M.C., LL.B., 30 Glasgow Road, Denny.

Granted 1938. (Grants in abeyance 1940-45—on account of the war.)

9. EASTERN DISTRICT OF STIRLINGSHIRE AGRICULTURAL ASSOCIATION.

Convener—William Morton, Bensfield, Falkirk.*Secretary*—Robert Waugh, Auction Mart, Falkirk.

Granted 1935. (Grant in abeyance 1937—on account of Alloa Show; in 1938—no Show held; in 1940-45—on account of the war.)

10. NEILSTON AGRICULTURAL SOCIETY.

Convener—J. Kerr Gillespie, Neilston House, Neilston.*Secretary*—John M. Morton, The Clydesdale Bank Ltd., Neilston.

Granted 1939. (Grants in abeyance 1941-45—on account of the war.)

11. WEST LOTHIAN AGRICULTURAL SOCIETY.

Convener—Frank Dawson of Wester Drumcross, Bathgate.*Secretary*—John L. M'Leod, Commercial Bank of Scotland Ltd., Bathgate.

Granted (to Bathgate Agricultural Association) 1938. (Grants in abeyance 1940-45—on account of the war.)

3rd (Alternate) Year—GRANT OF £12.

12. BLACK ISLE FARMERS' SOCIETY.

Convener—John D. Maciver, Kilcoy Mains, Killearnan, Ross-shire.*Secretary*—Robert Strachan, M.A., The Schoolhouse, Avoch, Ross-shire.

Granted 1937. (Grant in abeyance 1938; in 1940-46—on account of the war.)

13. CARNWATH AGRICULTURAL SOCIETY.

Convener—John Struthers, Anston, Dunsyre, Lanark.

Secretary—John N. Lennox, Commercial Bank Office, Carnwath, Lanarkshire.

Granted 1939. (Grants in abeyance 1940-45—on account of the war.)

14. DUNBARTONSHIRE AGRICULTURAL SOCIETY.

Convener—James R. Lumsden of Arden, Dunbartonshire.

Secretary—George M. Charleson, Commercial Bank of Scotland Ltd., Alexandria, Dunbartonshire.

Granted 1939. (Grants in abeyance 1940-45—on account of the war.)

15. FORMARTINE AGRICULTURAL ASSOCIATION.

Convener—E. B. Lee, Bullroad, Tarves, Aberdeenshire.

Secretaries—Alfred Marr and David S. Minto, Cultercullen, Udney Station, Aberdeenshire.

Granted 1938. (Grants in abeyance 1940-46—on account of the war.)

16. LOCKERBIE AGRICULTURAL SOCIETY.

Convener—Captain Joseph Steel of Kirkwood, Lockerbie.

Secretaries—Henderson & Mackay, Solicitors, Lockerbie.

Granted 1939. (Grants in abeyance 1940-45—on account of the war.)

17. MID-ARGYLL AGRICULTURAL SOCIETY.

Convener—Neil M'Neill, Dunamuck Farm, Kilmichael Glassary, by Lochgilphead, Argyll.

Secretary—Major J. G. Mathieson, Ri-Cruin, Kilmartin, by Lochgilphead, Argyll.

Granted 1939. (Grants in abeyance 1940-45—on account of the war.)

18. SKYE AGRICULTURAL SOCIETY.

Convener—A. MacCallum, D.O.A.S., Estates Office, Portree, Isle of Skye.

Secretary—S. Lindsay Hamilton, D.O.A.S., Estates Office, Portree, Isle of Skye.

Granted 1938. (Grants in abeyance 1940-46—on account of the war.)

19. STRATHSPEY FARMERS' CLUB.

Convener—James Gordon, Lower Delliefure, Grantown-on-Spey.

Secretary—Thomas Gordon, M.A., LL.B., 33 The Square, Grantown-on-Spey.

Granted 1938. (Grants in abeyance 1938, 1940-46.)

20. STIRLING AGRICULTURAL SOCIETY.

Convener—William Muirhead, Foot o' Green, Stirling.

Secretary—William Thomson, Estates Office, Polmaise, Stirling.

Granted 1939. (Grants in abeyance 1940-45—on account of the war.)

21. STONEHOUSE AGRICULTURAL SOCIETY.

Convener—William Wilson, Udston Farm, Stonehouse, Lanarkshire.

Secretary—J. Law, 1 Kirk Street, Stonehouse, Lanarkshire.

Granted 1938. (Grants in abeyance 1940-46—on account of the war.)

22. STRATHBOGIE FARMER CLUB.

Convener—R. J. J. Anderson, Nether Aucharnie, Forgue, Aberdeenshire.

Joint Secretaries—James Ogilvie and A. S. Wilson, Commercial Bank Buildings, Huntly.

Granted 1938. (Grants in abeyance 1940-46—on account of the war.)

2nd (Intermediate) Year—3 SILVER MEDALS.**23. BUCHAN AGRICULTURAL SOCIETY.**

Convener—Douglas J. Fowles, Millhill, Longside, Mintlaw Station, Aberdeenshire.

Secretary—Robert Scott, Solicitor, Town House, Fraserburgh.
Granted 1946.

24. BUTE AGRICULTURAL SOCIETY.

Convener—James D. M'Kay, Barone Park Farm, Rothesay.

Secretary—J. M. Mathieson, County Buildings, Rothesay.
Granted 1946.

25. CARLUKE AGRICULTURAL SOCIETY.

Convener—A. S. Lawson, Easterseat, Carluke.

Joint Secretaries—William Hamilton and W. Ramsay Robertson, 40 Cassels Street, Carluke.

Granted 1940. (Grants in abeyance 1940-45—on account of the war.)

26. CROMAR, UPPER DEE, AND DONSIDER AGRICULTURAL SOCIETY.

Convener—Lieut.-Colonel William Lilburn of Coull, Aboyne, Aberdeenshire.

Secretary—J. T. Taylor, Bank House, Tarland, Aberdeenshire.

Granted 1939. (Grants in abeyance 1940-46—on account of the war.)

27. EAST OF FIFE AGRICULTURAL SOCIETY.

Convener—Sir David Erskine, Bt., of Cambo, Kingsbarns, Fife.

Secretary—D. MacCulloch, National Bank of Scotland Ltd., Elie, Fife.

Granted 1946.

28. FETTERCAIRN FARMERS' CLUB.

Convener—John Grant, West Ballochry, Montrose.

Secretary—W. D. Johnston, Southesk Granaries, Montrose,
Granted 1946.

29. KENNETHMONT AGRICULTURAL ASSOCIATION.

Convener—Alexander Anderson, Percylieu, Clatt, Kennethmont, Aberdeenshire.

Secretary—William Henderson, Ardmore Villa, Kennethmont.
Granted 1939. (Grants in abeyance 1940-46—on account of the war.)

30. KILFINICHEN AND KILVICKEON AGRICULTURAL SOCIETY.

Convener—Donald Macdonald, Sheepknowe, Bunessan, Isle of Mull.

Secretary—William R. MacDougall, Uisgean, Bunessan, Isle of Mull.

Granted 1946.

31. KINCARDINESHIRE FARMERS' CLUB.

Convener—W. Cheyne Martin of Farrochie, Stonehaven.

Secretary—Grant M'Robert, Solicitor, Stonehaven.

Granted 1946.

32. LESLIE AND DISTRICT AGRICULTURAL SOCIETY.

Convener—William Kerr, Kininmonth, Kinglassie, Fife.

Secretary—James S. Hardie, 22 Paterson Park, Leslie, Fife.

Granted 1946.

33. STEWARTRY AGRICULTURAL SHOW.

Promoted by the St Mary's Isle Agricultural Society, the Dalbeattie Agricultural Society, and the Gatehouse District Agricultural Society.

Secretary—R. Ian Hewat, B.L., Union Bank Buildings, Castle Douglas.

Granted 1939. (Grants in abeyance 1940-46—on account of the war.)

34. UPPER DEESIDE AGRICULTURAL ASSOCIATION.

Convener—

Secretary—William Kemp, Bank House, Torphins, Aberdeenshire.

Granted 1939. (Grants in abeyance 1940-46—on account of the war.)

35. UNITED EAST LOTHIAN AGRICULTURAL SOCIETY.

Convener—A. G. Spence, Lempockwells, Pencaitland.

Secretaries—Stirling & Burnet, Solicitors, Haddington.

Granted 1940. (Grants in abeyance 1940-45—on account of the war.)

36. WEST TEVIOTDALE AGRICULTURAL SOCIETY.

Convener—James W. P. Amos, Northhouse, Hawick.

Joint Secretaries—W. R. Kirkpatrick and R. E. Grieve, Royal Bank Buildings, Hawick.

Granted 1946.

37. WESTERN DISTRICT OF FIFE AGRICULTURAL SOCIETY.

Convener—William Dick, Transy, Dunfermline.

Secretary—James G. Pollock 17 Charles Street, Dunfermline,
Granted 1946.

1st Year—GRANT OF £12.**38. ANGUS HORSE BREEDERS' ASSOCIATION.***Convener*—John Duff, Broomknowe, Brechin.*Secretary*—S. M'Gill, The National Bank of Scotland Ltd., Forfar.

Granted 1947.

39. ARDOCH AGRICULTURAL SOCIETY.*Convener*—John G. Battison, Greenloaning, Braco.*Secretary*—Ian M'Kerracher, 28 Union Street, Stirling.

Granted 1947.

40. ARRAN FARMERS' SOCIETY.*Convener*—James Brown, Corriecravie, Lamlash.*Secretary*—Kenneth D. Hamilton, Ardlui, King's Cross, Arran.

Granted 1947.

41. KIRRIEMUIR DISTRICT AGRICULTURAL ASSOCIATION.*Convener*—Edward Weighton, Caddam, Kirriemuir.*Secretary*—William M. Wallace, National Bank of Scotland Ltd., Kirriemuir.

Granted 1947.

42. LORN AGRICULTURAL SOCIETY.*Convener*—John MacMillan, Ferlochan, Benderloch, Connel, Argyll.*Secretary*—J. C. Bell, National Bank Buildings, Oban.

Granted 1939. (Grants in abeyance 1939-46—on account of the war.)

43. NEWTOWN ST BOSWELLS AND DISTRICT FARMERS' CLUB.*Convener*—Major R. Scott Aiton, M.C., Legerwood, Earlston.*Secretary*—Major D. Burns, O.B.E., M.C., The British Linen Bank Buildings, Newtown St Boswells.

Granted 1947.

44. SOUTH UIST AND BENBECULA CATTLE SHOW SOCIETY.*Convener*—Dr G. MacKinnon, Sorelle Lodge, Benbecula, Isle of South Uist.*Secretary*—John MacLeod, Bualuachrach, Eochar, Isle of South Uist.

Granted 1947.

45. UPPER DONSIDER AGRICULTURAL SOCIETY.*Convener*—Robert Keir, Kinbattoch, Glenkindie, Aberdeenshire.*Secretary*—John Strachan, Milton, Glenkindie, Aberdeenshire.

Granted 1946.

46. WESTERN DISTRICT OF MIDLOTHIAN AGRICULTURAL ASSOCIATION.*Convener*—.....*Secretary*—Maxwell C. Dick, 125 Constitution Street, Leith.

Granted 1940. (Grants in abeyance 1940-46—on account of the war.)

CLASS 2.

HORSE ASSOCIATIONS—GRANTS OF £15 IN RESPECT OF STALLIONS ENGAGED FOR AGRICULTURAL PURPOSES.

REGULATIONS, 1947.

1. The Highland and Agricultural Society will make Grants to Horse Associations and other Societies in different districts engaging Stallions for agricultural purposes. The total sum expended by the Highland and Agricultural Society in such Grants shall not exceed the sum of £210 in any one year.

(*Note.*—As a special provision this sum has been raised to £300 for the year 1947.)

2. All applications must be at the instance of a Horse Association. Either the Convener or the Secretary must be a member of the Highland and Agricultural Society of Scotland.

3. *Application of Grant.*—The portion of the Grant to any one Association or Society shall not exceed the sum of £15 in any one year. It is intended that the Grant shall be used by the Association or Society for the purpose of enabling it to secure a better class of Stallion.

4. *Duration of Grant.*—The Grant will continue for three consecutive years.

5. *Registration of Stallions.*—The Grants will be available only for Stallions which, for the years to which the Grants apply, are registered in the Register of Certified Draught Stallions published by the Department of Agriculture for Scotland. (For information regarding the Registration of Stallions, apply to the Secretary of the Department of Agriculture for Scotland, St Andrew's House, Edinburgh.)

6. *Engagement of Stallions.*—In the event of a Horse not being engaged in any one year while the provisions of the Grant are in force, the Grant made by the Highland and Agricultural Society will cease.

7. *Report to be Submitted.*—Forms of Report will be furnished to the Secretaries. Full details, as required, must be given and the completed Reports, duly signed and certified, must be lodged with the Secretary of the Highland and Agricultural Society as soon as possible, and in no case later than 1st November. These Reports are subject to the approval of the Directors of the Highland and Agricultural Society, against whose decision there shall be no appeal. The Grant will lapse if no Report is lodged by the due date.

8. *Payment of Grant.*—Grants will be paid in December after the Reports have been received and found to be in order and passed by the Board of Directors.

9. *Renewal of Grant.*—An Association or Society which has received a Grant shall not be eligible to apply for a renewal of the Grant until after the expiry of three years from the termination of the previous Grant. In disposing of applications the Directors of the Highland and Agricultural Society of Scotland shall keep in view the length of interval that has elapsed since making a previous Grant, giving priority to those Associations or Societies which have been longest without a Grant.

Grants in 1947.

3rd and Final Year—GRANT OF £15.

1. CAITHNESS CLYDESDALE HORSE-BREEDING SOCIETY.

Convener—Donald Harrold, Lower Reiss, Wick.

Secretary—John Gowans, Janetstown, Wick.

Granted 1945.

2. DALKEITH AGRICULTURAL SOCIETY.

Convener—R. H. Watherston, Crichton Mains, Ford, Midlothian.

Secretary—D. M. Webster, 5 Clifton Terrace, Edinburgh 12.

Granted 1945.

3. KINROSS-SHIRE AGRICULTURAL SOCIETY.

Convener—

Secretary—John F. Watson, M.R.C.V.S., Ardmohr, Stirling Road, Milnathort.

Granted 1945.

4. SOUTH DEESIDE STOCK IMPROVEMENT SOCIETY.

Convener—James Blackhall, Upper Balfour, Durris, Drumoak.

Secretary—John Duncan, Hall Cottage, Kirkton, Durris, Drumoak.

Granted 1945.

2nd Year—GRANT OF £15.

5. FIFE AGRICULTURAL SOCIETY.

Convener—Hugh L. Stewart, Struthers Farm, Ceres, Fife.

Secretary—T. Landale Rollo, LL.B., Solicitor, Cupar, Fife.

Granted 1946.

6. MORAY STOCK IMPROVEMENT SOCIETY.

Convener—James Royan, New Alves, by Elgin.

Secretary—Colonel W. Rose Black, Solicitor, Elgin.

Granted 1946.

7. SELKIRK AND GALASHIELS AGRICULTURAL SOCIETY.

Convener—Matthew Templeton, Goshen Bank, Kelso.

Secretary—Alexander S. Hogg, Birkenside, Earlstoun, Berwickshire.

Granted 1946.

8. SHAPANSEY AGRICULTURAL ASSOCIATION.

Convener—William T. Wood, Balfour Mains, Shapansey, Orkney.

Secretary—D. L. Kemp, Bayview, Shapansey, Orkney.
Granted 1946.

9. STONEHAVEN DISTRICT HORSE-BREEDING ASSOCIATION.

Convener—James Beattie, Clayfolds, by Stonehaven.

Secretary—Grant M'Robert, Solicitor, Stonehaven.
Granted 1946.

10. UPPER DONSIDE AGRICULTURAL SOCIETY.

Convener—Robert Keir, Kinbattoch, Glonkindie, Aberdeenshire.

Secretary—John Strachan, Milton, Glenkindie, Aberdeenshire.
Granted 1946.

1st Year—GRANT OF £15.

11. ANGUS HORSE BREEDING SOCIETY.

Convener—William J. Reid, Fordhouse of Dun, Montrose.

Secretary—S. M'Gill, The National Bank of Scotland Ltd., Forfar.

Granted 1947.

12. FYVIE AND DISTRICT HORSE BREEDING SOCIETY.

Convener—S. A. Niven, Sunnyside, Rothienorman, Aberdeenshire.

Secretary—Roderick G. Walker, Cuttlecraigs, Inverurie, Aberdeenshire.

Granted 1947.

13. HOWE OF THE MEARNS HORSE BREEDING ASSOCIATION.

Convener—James Lyall, Muirhead, St Cyrus.

Secretaries—W. J. C. Reed & Sons, Solicitors, Laurencekirk.
Granted 1947.

14. KIRRIEMUIR DISTRICT AGRICULTURAL ASSOCIATION.

Convener—Edward Weighton, Caddam, Kirriemuir.

Secretary—William M. Wallace, The National Bank of Scotland Ltd., Kirriemuir.

Granted 1947.

15. STIRLING AND ALLOA HORSE BREEDING SOCIETY.

Convener—Thomas G. Reid, J.P., Ashcroft, Bridge of Allan.

Secretary—William Muirhead, Foot o' Green, Stirling.
Granted 1947.

CLASS 3.

LOCAL AGRICULTURAL SOCIETIES—GRANTS OF
SILVER MEDALS IN AID OF PREMIUMS.

REGULATIONS, 1947.

The Society, being anxious to co-operate with local Societies, will give a limited number of Silver Medals annually to Societies (but not concurrently if also in receipt of a Grant under Class 1), in addition to the Money Premiums offered by them, for—

1. Best Bull, Cow, or Heifer of any pure breed specified in Class 1.
2. Best Stallion or Mare of any pure breed specified in Class 1.
3. Best Tup or Pen of Ewes of any pure breed specified in Class 1.
4. Best Boar, Sow, or Breeding Pig of any pure breed.
5. Best Pens of Poultry.
6. Best Sample of any variety of Wool.
7. Best Sample of any variety of Seeds.
8. Best-managed Farm.
9. Best-managed Green Crop.
10. Best-managed Hay Crop.
11. Best-managed Dairy.
12. Best Sweet-Milk Cheese.
13. Best Cured Butter.
14. Best Fresh Butter.
15. Best Collection of Roots.
16. Best-kept Fences.
17. Best Sheep-Shearer.
18. Most expert Hedge-Cutter.
19. Most expert Labourer at Draining.
20. Best Maker of Oatcakes.

It is left to the local Society to choose out of the foregoing list the classes to which the Medals are to be allocated.

RULES OF COMPETITION.

1. All Competitions must be at the instance of a local Society.
2. The classes for which Medals are granted must be in accordance with the foregoing list. The local Committee shall select the classes, and specify them in the Report.
3. The offer of the Medals must be announced in the Premium List and Catalogue of the Show as "presented by the Highland and Agricultural Society of Scotland."
4. The Medals are granted for two years, and lapse if not awarded in those years.
5. No Society shall receive more than two Medals in any year.
6. A Committee of Management shall be appointed, and either the Convener of the Committee or the Secretary of the Society must be a member of the Highland and Agricultural Society of Scotland.
7. When it is agreed to hold the General Show of the Society in any one of the Show Divisions, no local Society may hold a Show

within that Division in the three months immediately preceding the date of the General Show. In the event of a Show being held, the entire Grant will be cancelled.

8. The Money Premiums given in the District must be not less than £2 for each Medal offered.

9. The Medal for Sheep-Shearing shall always accompany the highest Money Premium.

10. There must not be fewer than three competitors in all the

11. Regarding Reports and despatch of Medals, Rules 10 and 11, Class 1, will apply.

12. When a grant of Medals has expired, a Society can only apply again for Medals after the lapse of a period of two years.

CLASS 4.

SPECIAL GRANTS—1947.

(1) ANNUAL.

1. NORTHERN COUNTIES ARTS AND CRAFTS SOCIETY—£20.

Convener—Miss Mackintosh of Raigmore, Raigmore, Inverness.

Joint Secretaries—Mrs Mitford, Berryfield, Lentrán, Inverness, and Miss Ruth C. Mackintosh, Raigmore, Inverness.

Granted 1922.

2. SCOTTISH ALLOTMENTS AND GARDENS SOCIETY.

£15 and 15 Medium Silver Medals to be offered as Prizes for best Allotments.

Secretary and Treasurer—William S. M'William, 48 Edgehill Road, Glasgow, W.1.

Granted 1927.

3. SHETLAND FLOCK BOOK SOCIETY.

£10, 10s. to be offered at Tingwall Show as Prizes for Shetland Sheep, judged according to the standard of the Flock Book Society.

Convener—John Sutherland, Bixter, Shetland.

Secretary—John S. Johnston, Brentham Place, Lerwick.

Granted 1938, for the years 1938-1942 inclusive. (Grants in abeyance 1939-46—on account of the war.)

(2) IN ALTERNATE YEARS.—GRANTS OF £3 IN 1947.

£3 to each Society, to be competed for at the Annual Shows.

4. ORKNEY AGRICULTURAL SOCIETY.

Convener—Charles Hourston, Beaquoy Farm, Dounby, Kirkwall, Orkney.

Secretary—Gordon Watt, Kirkwall, Orkney.

Granted 1883.

5. EAST MAINLAND AGRICULTURAL SOCIETY, ORKNEY.

Convener—William G. Smith, Hall of Tankerness, Tankerness, Orkney.

Secretary—Alfred C. Tait, Quoykea, Toab, Kirkwall.

Granted 1898.

6. WEST MAINLAND AGRICULTURAL SOCIETY, ORKNEY.

Convener—John R. Sabiston, Arion, Stromness, Orkney.

Secretary—George T. Wylie, Swartland, Twatt, Kirkwall, Orkney.

Granted 1900.

7. SANDAY AGRICULTURAL ASSOCIATION, ORKNEY.

Convener—W. Cowper Ward, Scar House, Sanday, Orkney.

Secretary—John Thomson, Ortie, Sanday, Orkney.

Granted 1902.

8. YELL AGRICULTURAL SOCIETY, SHETLAND.

Convener—T. R. Manson, Ladybank, West Sandwick, Lerwick.

Secretary—Robert Johnson, The Manse, West Sandwick, Lerwick.

Granted 1931.

(3) IN ALTERNATE YEARS.—GRANTS IN ABEYANCE IN 1947.

9. ROUSAY AGRICULTURAL SOCIETY, ORKNEY.

Convener—David C. Moar, Saviskaill, Rousay, Orkney.

Secretary—Ronald Shearer, Curquoy, Rousay, Orkney.

Granted 1903.

10. SOUTH RONALDSHAY AND BURRAY AGRICULTURAL SOCIETY, ORKNEY.

Convener—David R. Duncan, "Flaws," South Parish, South Ronaldshay.

Secretary—William Thomson, St Margaret's Hope, Orkney.

Granted 1904.

11. SHAPANSEY AGRICULTURAL ASSOCIATION, ORKNEY.

Convener—William T. Wood, Balfour Mains, Shapansey, Orkney.

Secretary—D. L. Kemp, Bayview, Shapansey, Orkney.

Granted 1934.

CLASS 5.

FEDERATIONS OF SCOTTISH WOMEN'S RURAL
INSTITUTES—GRANTS OF £10.

REGULATIONS, 1947.

1. The Highland and Agricultural Society of Scotland will provide annually a sum not exceeding £150 as special Grants to Federations of Scottish Women's Rural Institutes.

2. *Grant to Federation.* £10.—The amount of the Grant to any one Federation shall not exceed the sum of £10 per annum.

3. *Duration of Grant.*—The Grant will continue for two consecutive years.

4. *Disposal of Applications.*—In disposing of applications for Grants, the Directors of the Highland and Agricultural Society shall keep in view the length of interval that has elapsed since the expiration of the last Grant, giving priority to those Federations which have been longest off the list.

5. *Eligibility to Apply.*—All applications must be at the instance of a properly constituted Federation of Institutes.

6. *Application of Grant.*—The Grant of £10 shall not be applied as a Grant-in-aid to the general funds of a Federation, but must be offered in the form of Prizes at any Show or Competition held under the auspices of the Federation.

7. *Announcement of Grant.*—The offer of Prizes must be announced in the Prize List or Catalogue of the Show or Competition as "presented by the Highland and Agricultural Society of Scotland," or the amount of the Grant must be shown as a separate item of donation in the published statement of Accounts.

8. *Rules of Competition.*—The Rules of Competition for the Prizes, the funds for which are derived from Grants of the Highland and Agricultural Society of Scotland, shall be such as are generally enforced in the case of Prizes offered from the Federation's own funds.

9. *Report to be Submitted.*—Forms of Report will be furnished to the Secretaries of Federations, and these must be completed and returned to the Society as soon as possible after the Show or Competition and in no case later than 1st November. These Reports are subject to the approval of the Directors of the Highland and Agricultural Society, against whose decision there shall be no appeal. All Reports must be signed and certified as marked on the Form.

The Grant will lapse if no Report is lodged.

10. *Payment of Grant.*—Payment of the Grant will be made in December after the Reports of the Awards have been received and found to be in order and passed by the Board of Directors.

11. *Renewal of Grant.*—A Federation which has received a Grant for two consecutive years shall not be eligible to apply for a renewal of the Grant until after the expiry of two years from the termination of the previous Grant.

Grants in 1947.**2nd Year.****1. BERWICKSHIRE FEDERATION.***Convener*—Mrs Stevenson, Blackburn, Lauder.*Secretary*—Miss A. M'B. Cowan, Roselea, Oxtou, Berwickshire.

Granted 1946.

2. DUMFRIESSHIRE FEDERATION.*Convener*—Mrs Graham, Mossknowe, Kirkpatrick-Fleming.*Secretary*—Mrs Forrester, Kilness, Dumfries.

Granted 1939. (Grants in abeyance 1940-46.)

3. DUNBARTONSHIRE FEDERATION.*Convener*—Miss E. G. Murray, M.B.E., Moore Park, Cardross
Dumbartonshire.*Secretary*—Mrs Dunlop, Albyn, Cardross, Dumbartonshire.

Granted 1946.

4. EAST LoTHIAN FEDERATION.*Convener*—Mrs Hay, Belton, Dunbar.*Secretary*—Mrs M'Kemnie, 2 Wemyss Place, Haddington.

Granted 1938. (Grants in abeyance 1938, 1940-46.)

5. MIDLoTHIAN FEDERATION.*Convener*—Mrs Pettigrew, Bankton House, Midcalder.*Secretary*—Mrs Stewart, 7 Hillside Crescent, Edinburgh 7.

Granted 1940. (Grants in abeyance, 1940-41, 1943-46.)

6. Ross-SHIRE FEDERATION.*Convener*—Mrs Fraser Mackenzie, Croc-na-boul, Muir of Ord.*Secretary*—Mrs Anderson, Strathallan, Fortrose.

Granted 1939. (Grants in abeyance 1940-46.)

1st Year.**7. FIFE FEDERATION.***Convener*—Mrs Thomson, Craigsanquhar, Cupar, Fife.*Secretary*—Miss Katherine A. Don, 15 Olympia Arcade,
Kirkcaldy.

Granted 1947.

8. PERTHSHIRE AND KINROSS-SHIRE FEDERATION.*Convener*—Mrs Islay Molteno, Glenlyon House, Fortingall,
Perthshire.*Secretary*—Mrs Methven, St Martin's Abbey, by Perth.

Granted 1947.

9. ROXBURGHSHIRE FEDERATION.

Convener—Mrs Sparling, Teviot Bank, Hawick.

Secretary—Lady Ramsay-Fairfax-Lucy, Meadow House, St Boswells.

Granted 1947.

10. SELKIRKSHIRE FEDERATION.

Convener—Mrs Meade, The Hangingshaw, near Selkirk.

Secretary—Miss M. R. Lawson, Caddon Dene, near Galashiels.

Granted 1947.

GROUP III.—COTTAGES AND GARDENS, &c.

The following Premiums are offered for Competition.
The Premiums are granted for two years.

CLASS 6.**LOCAL SOCIETIES, &c.—GRANTS FOR BEST-KEPT
COTTAGES AND GARDENS.**

1. Best-kept Cottage	£1 0 0
Second best	0 10 0
2. Best-kept Cottage Garden	1 0 0
Second best	0 10 0

Forms of application may be obtained from the Secretary, and should be completed and returned on or before 1st November next, in respect of a Grant commencing in the following year.

RULES OF COMPETITION.

1. Competitions may take place in the different parishes for Cottages and Gardens, or for either separately.

2. The occupiers of Lodges at Gentlemen's Approach Gates and Gardeners' Houses are excluded, as well as others whom the Committee consider, from their position, not to be entitled to compete. The inspection must be completed by the 1st of October. In making the inspection, the Conveners may take the assistance of any competent judges.

3. It shall be left to the Committee in the District to fix two grades of Cottages, with maximum rents of £10 and £16 respectively, and to apply for Grants of £3 in respect of each.

4. To warrant the award of full Premiums, there must not be fewer than three Competitors in each class. If there are less than three Competitors in each class, only half Premium will be awarded.

5. A person who has gained the highest Premium cannot compete again.

6. If the Cottage is occupied by the proprietor, the roof must be in good repair; if the roof is thatch, it must be in good repair, though in the occupation of a tenant. The interior and external conveniences must be clean and orderly; the windows must be free of broken glass, clean, and affording the means of ventilation. Dunghills, and all other nuisances, must be removed from the front and gables. In awarding the Cottage Premiums, preference will be given to Competitors who, in addition to the above requisites, have displayed

the greatest taste in ornamenting the exterior of their houses, and the ground in front and at the gables.

7. In estimating the claims for the Garden Premiums, the judges should have in view—the sufficiency and neatness of the fences and walks: the cleanness of the ground; the quality and choice of the crops; and the general productiveness of the Garden.

8. Reports, stating the number of Competitors, the names of successful parties, and the nature of the exertions which have been made by them, must be lodged with the Secretary of the Highland and Agricultural Society *on or before 1st November next*.

9. When a grant of Money has expired, the District cannot apply again for aid for four years.

Grants in 1947.

1st Year.

1. BENBECULA HORTICULTURAL SOCIETY.

Convener—Mrs Paterson, Howmore House, Howmore, by Lochboisdale, South Uist.

Secretary—Douglas H. Kerr, Creagorry Hotel, Benbecula, South Uist.

Granted 1946.

CLASS 7.

LOCAL SOCIETIES, &c.—GRANTS OF MINOR SILVER MEDALS FOR BEST-KEPT COTTAGES AND GARDENS, GARDEN PRODUCE, POULTRY, AND HONEY.

RULES OF COMPETITION.

1. The Society will give annually one or two Minor Silver Medals to a limited number of local Associations or individuals, who establish Competitions and Premiums for Cottages, Gardens, Garden Produce, or Bee-Keeping. The Medals will be granted for two years.

2. The Medals may be offered in any two of the following sections, *but under no circumstances will the two Medals be given in one of the sections* :—

- (1) Best-kept Cottage or best-kept Cottage and Garden. (One Medal only.)
- (2) Best-kept Garden. (One Medal only.)
- (3) Best Collection of Garden Produce—Flowers excluded. (One Medal only.)
- (4) Best Pen of Poultry. (One Medal only.)
- (5) Honey. (One Medal only.)

3. The annual value of each Cottage, with the ground occupied in the parish by a Competitor, must not exceed £20. The occupiers of

Lodges at Gentlemen's Approach Gates, and Gardeners in the employment of others, are not entitled to compete.

4. If Competition takes place for Garden Produce, such produce must be *bona fide* grown in the Exhibitor's Garden. He will not be allowed to make up a collection from any other Garden. The produce must consist of Vegetables, or Vegetables and Fruit (not Fruit alone). Flowers are excluded.

5. The Honey must be the produce of the Exhibitor's own Hives.

6. To warrant the award of a Medal, there must not be fewer than three Competitors.

7. Forms of Report of Competitions will be furnished to the Secretaries in the different Districts. These must, in all details, be completed and lodged with the Secretary of the Highland and Agricultural Society as soon as possible after the Competition, and in no case later than *1st November*, for the approval of the Directors, against whose decisions there shall be no appeal.

8. If no Competition takes place in a District for two years the grant expires.

9. When a grant of Medals has expired, the District cannot apply again for a similar grant until after the lapse of a period of two years.

Grants in 1947.

1st Year.

1. BENBECULA HORTICULTURAL SOCIETY.

Convener—Mrs Paterson, Howmore House, Howmore, by Lochboisdale, South Uist.

Secretary—Douglas H. Kerr, Creagorry Hotel, Benbecula, South Uist.

Granted 1946. (2 Medals.)

GROUP IV.—PLOUGHING, HOEING, AND LONG FARM SERVICE.

1. MEDALS FOR PLOUGHING COMPETITIONS.

The Ploughing Medal will be given to the winner of the first Premium at Horse and Tractor Ploughing Competitions, provided Reports in the following terms on the official forms are made to the Secretary, within one month of the Competition, by a Member of the Society. Forms of Report to be had on application.

HORSE PLOUGHING.

FORM OF REPORT.

I, _____ of _____, Member of the Highland and Agricultural Society, hereby certify that I attended the Ploughing Match of the _____ Association at _____ in the county of _____ on the _____ when _____ Horse ploughs competed ; _____ of land were assigned to each, and _____ hours were allowed for the execution of the work. The sum of £ _____ was awarded as follows :—

[Here enumerate the names and designations of successful Competitors.]

RULES OF COMPETITION.

1. All Matches must be at the instance of a local Society or Ploughing Association, and no Match at the instance of an individual, or confined to the tenants of one estate, will be recognised.

2. The title of such Society or Association, together with the name and address of its Secretary, must be registered with the Secretary of the Highland and Agricultural Society of Scotland, 8 Eglinton Crescent, Edinburgh.

3. Not more than one Match in the same season can take place within the bounds of the same Society or Association.

4. All Reports must be lodged within one month of the date of the Match, and certified by a Member of the Highland and Agricultural Society who was present at it.

5. A Member can report only one Match ; and a Ploughman cannot carry more than three Medals in the same season.

6. To warrant the grant of the Medal, there must have been 12 Ploughs in actual competition for the Medal (*i.e.*, in the particular class for which the Medal was offered) and not less than £3 awarded in Prizes by the local Society. The Medal to be given to the winner of the first prize.

7. The local Society or Ploughing Association shall decide what class of ploughs shall compete for the Medal, and if so agreed, may offer it for competition to the class of plough most generally in use in the district.

8. The local Society or Committee may, if they desire, arrange to let each Ploughman have one person to guide the horses for the first two and the last two furrows, but in no case shall Ploughmen receive any other assistance, and their work must not be set up or touched by others. Attention should be given to the firmness and sufficiency of the work below, more than to its neatness above the surface.

9. The local Committee is required to fix the time to be allowed for ploughing the portion of land, and they are recommended that the time be at the rate of not more than fourteen hours per imperial acre on light land, and eighteen hours on heavy or stony land.

TRACTOR PLOUGHING.

FORM OF REPORT.

I, _____ of _____, Member of the Highland and Agricultural Society, hereby certify that I attended the Ploughing Match of the _____ Association at _____ in the county of _____ on the _____ when _____ Tractor ploughs competed ; _____ of land were assigned to each, and _____ hours were allowed for the execution of the work. The sum of £ _____ was awarded as follows :—

[Here enumerate the names and designations of successful Competitors.]

RULES OF COMPETITION.

1-7. Rules for Horse Ploughing apply.

8. Attention should be given to the firmness and sufficiency of the work below, more than to its neatness above the surface.

9. The local Committee is required to fix the time to be allowed for ploughing the portion of land, and they are recommended that the time be at the rate of not more than seven hours per imperial acre on light land, and nine hours on heavy or stony land.

NOTE.—The attention of the Directors of the Society has frequently been drawn to certain irregularities which have occurred in connection with the conduct of Ploughing Matches and the completion of the Reports thereon. Complaints have been made (a) that the allotted amount of ground has not been ploughed, within the specified time, by the competitor awarded the first prize ; (b) that the Report sent to this Society has been signed by a Member of the Society who was not present at the Match. It has to be pointed out that any infringement of the above Rules by a local Society or Ploughing Association will render that Society or Association liable, at the discretion of the Board of Directors, to be debarred from receiving the Society's Medals.

2. MEDALS FOR HOEING COMPETITIONS.

The Minor Silver Medal will be given to the winner of the first Premium at Hoeing Competitions, provided a Report on the official form is made to the Secretary within a month of the Competition by a Member of the Society. Forms of Report to be had on application.

RULES OF COMPETITION.

1. All Matches must be at the instance of a local Society or Hoeing Association, and no Match at the instance of an individual, or confined to the tenants of one estate, will be recognised.

2. The title of such Society or Association, together with the name and address of its Secretary, must be registered with the Secretary of the Highland and Agricultural Society of Scotland, 8 Eglinton Crescent, Edinburgh.

3. Not more than one Match in the same season can take place within the bounds of the same Society or Association.

4. All Reports must be lodged within one month of the date of the Match, and certified by a Member of the Highland and Agricultural Society who was present at it.

5. A Member can only report one Match: and same Competitor cannot carry more than three Medals in the same season.

6. To warrant the grant of the Medal there must have been twelve hoes in competition, and not less than Three Pounds awarded in prizes by the local Society or Association. The Medal to be given to the winner of the first prize.

7. The time to be allowed to be decided by the local Committee, but in no case to exceed two hours for two drills of 100 yards each, the third drill being unoccupied, so that Competitors do not interfere with their neighbour's work.

8. Competitors must finish their work as they go along—no turning back or after-dressing allowed. Hand-picking or transplanting shall be strictly prohibited.

9. A Committee shall be appointed to watch the work, and any Competitor found transplanting or otherwise not complying with the Rules shall have his number withdrawn, and be debarred from receiving any prize which might otherwise have been awarded to him.

NOTE.—Medals will be awarded under similar conditions for Competitions in hand-singling.

3. CERTIFICATES AND MEDALS FOR LONG FARM SERVICE.

Certificates and Silver Medals for long service will be awarded by the Society to farm servants, male or female, having an approved service in Scotland of not less than thirty years (not necessarily continuous) —(a) with one employer on the same or different holdings; (b) on the same holding with different employers.

Special Certificates and Silver Gilt Medals are also awarded to farm servants, male or female, having an approved service in Scotland of not less than forty-five years (not necessarily continuous), on similar conditions of employment as the above.

Forms of Application are obtainable from the Secretary, 8 Eglinton Crescent, Edinburgh.

War Service to count towards the time required for qualification,

where farm servants have returned to same service or employment with same farmer or his family.

The award is strictly confined to workers, such as Ploughmen, Cattlemen, and Shepherds.

Domestic and House Servants and Estate workers, such as Foresters, Carters, Grooms, &c., are not eligible.

Awards in 1946.

The following received the Special Certificate and Silver Gilt Medal for service of forty-five years and over :—

Adams, Mary Ann, Auquhirie, Stonehaven.
 Blackstock, Joseph, Sandyford, Boreland, Lockerbie.
 Campbell, John M., Shore Cottage, Castlehill.
 Dailly, James, Hermiston, Currie.
 Dickson, Andrew, Crichton Mains, Ford.
 Donaldson, Robert, Naemoor, Rumbling Bridge.
 Finlayson, Archibald, Woodhouse Cottages, Woodhouse Farm, Manor.
 Foster, William, Newbigging Cottages, Winchburgh.
 Grieve, William, Hallrule Mill, Bonchester Bridge, Hawick.
 Harkness, John B., 5 Albert Place, Langholm.
 Henry, William, Redden, Kelso.
 Hyslop, Andrew, 79 Main Street, West Kilbride.
 Johnston, George, Middlethird, Gordon.
 Lambie, Robert, Woolfords, Cobbinshaw.
 M'Cormick, James, Awhirk, Stranraer.
 M'Gaw, James, Auchenfad, Auchencairn.
 M'Kay, Robert A., Orlig Mains, Castletown.
 M'Naughton, William, Broombrae, Auchtermuchty.
 Martin, William, Langburnshiels, Hawick.
 Murray, Alexander C., Braegrudie, Rogart.
 Semple, William, Pathhead, St Mungo, Lockerbie.
 Smith, James, The Lake, Kirkeudbright.
 Smith, John, Dromore, Kirkeudbright.
 Todd, William, Polnoon Farm, Eaglesham.
 Wilson, John, Lightshaw Farm, Muirkirk.

The following received the Silver Medal and Certificate for service of from thirty to forty-four years :—

Aikman, Adam J., Law Cottages, Coldingham.
 Anderson, W. T., Kenly Green, St Andrews.
 Archer, Joseph, Cornceres, Anstruther.
 Bayne, David, Loanside Farm, Clackmannan.
 Beaton, Hugh, Kilchamaig, Whitehouse, Argyll.
 Black, George, Latheronwheel Mains, Caithness.
 Blackie, Robert, Middlethird, Gordon.
 Brown, John, East Windygoul, Tranent.
 Bruce, Adam, Auchlee Cottages, Longside.

Buchan, Peter, Southfield, Dalkeith.
 Cadger, William, Errolston, Cruden Bay.
 Clark, John, 3 Wellington Street, Maybole.
 Coghill, Andrew, Clynelish Farm, Brora.
 Cowan, Mary, Southfield, Dalkeith.
 Crawford, William G., Hassendean, Hawick.
 Creamer, Bridget, Pefferside, Scoughall, North Berwick.
 Currie, John W., Whitton, Kelso.
 Cuthill, David, Myreside, Marykirk.
 Dickson, Thomas W., Lochenkit, Corsock, Castle Douglas.
 Dunnett, David, Hill Head, John o' Groats.
 Edwards, D. M'K., Thorniehill, Colvend, Dalbeattie.
 Elliot, Alexander H., Meikle Pinkerton, Dunbar.
 Fancie, James, Drumley Hill, Hurlford.
 Fortune, Alexander, Skateraw, Innerwick, Dunbar.
 Garvock, George, Newtonhill of Mill of Rathven, Buckie.
 Gordon, John A., Knightsmill, Drumblade, Huntly.
 Hannay, John, Cauldside, Gatehouse.
 Harper, William, Carsgoe Farm, by Halkirk.
 Herkes, Robert, Sunderland Farm, Galashiels.
 Hogg, James, Adelaide Cottage, Cockburnspath.
 Jack, John, Quintfall, Lyth, Wick.
 Jaffray, John, Priestlaw, Duns.
 Johnstone, Matthew, Carse of Ae, Lochmaben.
 Johnstone, Thomas H., Hillhouse, Hunterston, West Kilbride.
 Kerr, James F., Scoughall, North Berwick.
 Kerr, Robert, West Grange, Dunlop.
 Knox, John, Collielaw, Lauder.
 Laidlaw, Peter L., Pultadie, Glenwhilly, Newton Stewart.
 Laurie, Robert C., Lambholm, Parkgate, Dumfries.
 Lawson, William, Muirhouse, Symington.
 Learmonth, Alexander, Scoughall, North Berwick.
 Lightbody, Peter, Westburn Farm Cottages, Cambuslang.
 Low, George, Dalbog, Edzell.
 M'Adam, Hugh J., Drumfork Cottage, Helensburgh.
 M'Allister, Colin, Ploughman's Cottages, Newhouse Farm,
 Cambuslang.
 M'Cormick, Williamina, Awhirk, Stranraer.
 M'Donald, Archibald, Lochdunmore, Pitlochry.
 M'Intosh, Charles, The Braes, Kilbarchan.
 M'Intyre, Donald, Benlester, Lamlash, Arran.
 M'Keand, James, Cowgate, Garlieston.
 MacKenzie, Finlay, Dalmigavie Farm, Tomatin.
 Mackie, William, Ferryton Cottages, Loanside, Clackmannan.
 M'Kie, Alexander, Lochbrae, Lochlands, Maybole.
 M'Lanachan, Hugh, Craigie Home Farm, Ayr.
 M'Whirter, John, Wee Camlarg, Dalmellington.
 Main, James H., Scoughall, North Berwick.
 Maxwell, James L., 35 Abercromby Place, Menstrie.
 Meredith, J. G. O., Bassendean, Gordon.
 Moodie, William M., Pinwherrie Farm, Castle Kennedy.
 Mowbray, Thomas, Millbank, Coupar Angus.
 Murray, Andrew A., Southfield, Dalkeith.
 Murray, David P., Southfield Dalkeith.

Murray, William J., Dalgleish, Ettrick, Selkirk.
 Newlands, Thomas B., Newtonairds Cottages, Dumfries.
 Nicoll, Alexander D., Parkside Cottage, Parkhill, Arbroath.
 Nixon, Adam, Hillhead, Langholm.
 Paterson, William, Townhead, Mouswald.
 Patience, William, Tarrel, Fearn, Ross-shire.
 Pringle, Robert, Glenburn, Robertson, Hawick.
 Pryde, Thomas, Broomhall, Largo.
 Rae, William R., Burnside Farm, Girvan.
 Robertson, David B., North Lodge, Fetteresso Castle, Stonehaven.
 Scott, James D., Balcarres Mains Lodge, Colinsburgh.
 Scott, William E., Monkinshaw, Garwald, Langholm.
 Sewell, James, Greenlea, Colton, Dumfries.
 Shaw, Elizabeth A., Lesmurdie, Lower Cabraich, Huntly.
 Simmers, William W., Stirton Cottages, Cupar, Fife.
 Skeldon, Catherine, Edington Hill, Chirnside.
 Skeldon, James, Edington Hill, Chirnside.
 Skeldon, Peter, Edington Hill, Chirnside.
 Skeldon, William, Edington Hill, Chirnside.
 Smith, James, The Lake, Kirkcudbright.
 Smith, John, Dromore, Kirkcudbright.
 Steel, Gilbert, Craigie Home Farm, Ayr.
 Tenpleton, William, Craigdarroch, New Cumnock.
 Thom, George M., Westercoull Cottages, Tarland.
 Thompson, James, Thurston Home Farm, Innerwick.
 Thompson, Robert M., Grove Street, Musselburgh.
 Thomson, James, Preston, Duns.
 Thomson, James, Culscadden, Garlieston.
 Thomson, John, Old Schoolhouse, Cummertrees.
 Thomson, John, High Milton, Port William.
 Thomson, Robert S., Cessford, Kelso.
 Tulloch, Rose E., Binscarth Farm, Finstown, Orkney.
 Turnbull, Andrew L., Cleuchhead, Bonchester Bridge.
 Urquhart, John, Adziel, Strichen.
 Urquhart, William A., Tarrel, Fearn.
 Vannet, Robert, Strathmartine Castle, Dundee.
 Walker, Mrs C. A. M., Kulrenny, Anstruther.
 Walker, Robert, Bassendean, Gordon.
 Watt, James, Lochhouses, East Linton.
 Webster, Robert, Rannagulzion, Blairgowrie.
 White, Adam D., Scoughall, North Berwick.
 Wills, Isabella, Lessnessock Farm, Ochiltree.
 Wills, John, Lessnessock Farm, Ochiltree.
 Wilson, John, Corncees, Anstruther.
 Wilson, William, Garscadden Mains, Bearsden.
 Wyness, William, Ashgrove House, Aberdeen.

MEMBERS ADMITTED SINCE THE LIST WAS PUBLISHED IN APRIL 1945.

ARRANGED ACCORDING TO SHOW DISTRICTS.

(ELECTED 8TH JANUARY 1947 AND 4TH JUNE 1947.)

1.—GLASGOW DIVISION

LANARK

Admitted

- 1947 Aird, Robert, Farm Manager, Allanton Farm, Hamilton
1947 Cullen, William, Leadloch Farm, Fauldhouse (Lanarkshire)
1947 MacGregor, James (P. & R. Fleming & Company), 29 Argyle Street, Glasgow
1947 MacLean, Mrs Kathleen A., 108 Gower Street, Ibrox, Glasgow
1947 Marwick, Alexander Allardice, 1624 Great Western Road, Anniesland, Glasgow
1947 Meikle, Herbert A. G., M.R.C.V.S., Fairleigh, Ryeland Street, Strathaven

- 1947 Todd, A., Vacuum Oil Co., Ltd., 14 St Vincent Place, Glasgow, C.1

RENFREW

- 1947 Ferguson, James, Royal Bank House, Kilmacoolm
1947 M'Bride, Walter A. B. (Macfarlan, Shearer & Company), 12 Brisbane Street, Greenock
1947 M'Kellar, Archibald, Heathfield Farm, Lochwinnoch
1947 Macleod, George, Finuary, Old Mearns Road, Newton Mearns

2.—PERTH DIVISION

ANGUS

(WESTERN DISTRICT)

- 1947 Allison, David, Lynwood, Reid Park Road, Forfar
1947 Mitchell, James W., Nether Migvie, by Kirriemuir

- 1947 Rutherford, Captain Gideon Gordon, Baldowie, Coupar-Angus

KINROSS

- 1947 Purvis-Russell-Montgomery, Miss C., Hattonburn, Milnathort

3.—STIRLING DIVISION

CLACKMANNAN

- 1947 Stewart, Miss Grizel M., Arndean, Dollar

DUMBARTON

- 1947 Howie, Allan Stewart, Drumfork Farm, Craigendoran, Helensburgh
1947 Howie, Robert Lamont, Drumfork Farm, Craigendoran, Helensburgh
1947 M'Taggart, John, Muirhouses, Duntocher

PERTH

(STIRLING SHOW DISTRICT)

- 1947 Macrae, Captain A. T. Watters, Edinample, Lochearnhead
1947 Thomas, Mrs Elspeth Mary, Woodlands, Dunblane

- 1947 Watters, Miss Ada M. S., Edinample, Lochearnhead

STIRLING

- 1947 Fisher, Donald M., Ballamenoch, Buchlyvie
1947 Forbes, Lieut.-Colonel W., Callendar House, Falkirk
1947 Forsyth, Alexander, King's Park Farm, Stirling
1947 Forsyth, John, King's Park Farm, Stirling
1947 Patterson, Iain G. R., Cairngorm, Lennoxton
1947 Warnock, D. P., "Achnagowan," Killearn
1947 Warnock, J. P., "Achnagowan," Killearn

4.—EDINBURGH DIVISION

EAST LOTHIAN

- 1947 Fullarton, Alexander William, Tranent Mains, Tranent
1947 Simpson, Thomas J. D., Highfield, North Berwick

MID-LOTHIAN

- 1947 Dewar, James T. (Yorkshire Insurance Co., Ltd.), 67 George Street, Edinburgh 2
1947 Fleming, Robert (The British Wagon Co., Ltd.), 3 Westgarth Avenue, Colinton, Edinburgh

- 1947 Greig, K. J. A., Solicitor, 30 Belford Gardens, Edinburgh 4
1947 Henderson, H. P., B.Sc. (Agric.), 35 Mardale Crescent, Edinburgh 10
1947 Richardson, William A., Solicitor (Messrs Toda, Murray & Jamieson, W.S.), 66 Queen Street, Edinburgh 2

WEST LOTHIAN

- 1947 Allison, David, Duddingston, South Queensferry

5.—ABERDEEN DIVISION**ABERDEEN**

- 1947 Adam, William, 456 Great Western Road, Aberdeen
 1947 Bethell, Mrs J. S., Sunnyside, Ardincallie, Huntly
 1947 Collie, John M., Hillbrae, Bourtie, Inverurie
 1947 Leslie, George, Managing Secretary, Northern Co-operative Society, Ltd., 54 Loch Street, Aberdeen
 1947 M'Bride, Robert, Chelsea Road, Inverurie
 1947 MacWilliam, A. D., Home Farm, Cluny, Sauchen

- 1947 Mathewson, William Gray, Deeside Cottage, Aboyne
 1947 Mutch, George Thomas, Grain Merchant, Maud Station
 1947 Scott, William, Crichtie Cottage, Dunecht
 1947 Strachan, John, Milton, Glenkindie

ANGUS

(EASTERN DISTRICT)

- 1947 Ogilvie, Douglas Farquhar, Pitmules, Guthrie

6.—DUMFRIES DIVISION**DUMFRIES**

- 1947 Hamilton, David, Brieryhill, Lockerbie
 1947 Kirkpatrick, John Mitchell, Loch House, Beattock, Moffat

KIRKCUDBRIGHT

- 1947 Craigie, C. F., Schoolhouse, Cross-michael
 1947 Ross, Major Walter J. M., M.C., of Netherhall, Bridge of Dee, Castle Douglas

7.—INVERNESS DIVISION**INVERNESS**

- 1947 Maclean, Donald J., Teafish, Beauly

MORAY

- 1947 MORAY, The Earl of, M.C., Darnaway Castle, Forres

NAIRN

- 1947 Allan, Walter, Heathmount, Nairn
 1947 Bingham, J. S. M., Cawdor Estates Office, Nairn
 1947 Brodie, Major D. J., of Lethen, Nairn
 1947 Falconer, Charles, Blackhills, Auldearn, Nairn
 1947 Falconer, Gilbert, Blackhills, Auldearn, Nairn
 1947 Innes, John, Melkie Urchany, Nairn
 1947 James, George, Hardmuir, Nairn

- 1947 James, J. J. W., Melkie Kildrummie, Nairn
 1947 Ker, J., The Arr, Auldearn, Nairn
 1947 M'Kay, J. G. G., Torrich, Nairn
 1947 Mackintosh, John, Foynessfield, Nairn
 1947 Mackintosh, William, Blackcastle, Nairn
 1947 Robertson, Hugh, Newton of Cawdor, Nairn
 1947 Squair, George, Solicitor, Nairn
 1947 Taylor, Mrs J., Easter Golford, Nairn
 1947 Wilson, Mrs J. A., Broombank, Nairn

ORKNEY

- 1947 Stevenson, Robert, Jun., Bu' of Rothiesholm, Stronsay

ROSS AND CROMARTY

- 1947 MacWilliam, William, Drumondreich, Conon Bridge
 1947 Waugh, Sinclair L., Bogbain, Tain

8.—BORDER DIVISION**PEEBLES**

- 1947 Ballantyne, Henry Harrison, Langhaugh, Manor

ENGLAND AND WALES

- 1947 Bennett, Allan Richard, Secretary, National Pig Breeders' Association, Victoria House, Southampton Row, London, W.C.1
 1947 Cozens, Geoffrey (Commer Cars, Ltd.), Biscot Road, Luton, Beds.
 1947 Haldane, Robert Aylmer, 21 Gilston Road, London, S.W.10
 1947 Lyall, Fred W. (Dickson, Brown & Tait, Ltd.), 57 Cross Street, Manchester 2

- 1947 Lyon, Arthur J. (Dickson, Brown & Tait, Ltd.), 57 Cross Street, Manchester 2
 1947 Mason, Michael, Scott's House, Eynsham Park, Witney, Oxon.
 1947 Penney, Richard Leah (Firestone Tyre & Rubber Co., Ltd.), Great West Road, Brentford, Middlesex
 1947 Tresidder, W. B. V. (Spillers, Ltd.), 40 St Mary Axe, London, E.C.3

INDEX.

- Abstract of Accounts, 180.
Accounts, Annual, 180; Submitted to General Meeting, 206.
Agricultural Education: Reports on Examination held in 1946, 203, 207; Regulations and Syllabus, Appendix, 17.
Agricultural Examinations for 1947, Date of, Appendix, 16, 19.
Agricultural Research in Scotland in 1946: Institute of Animal Genetics, University of Edinburgh, 89; Animal Diseases Research Association, 90; Rowett Research Institute, 90; Scottish Plant-Breeding Station, 92; Hannah Dairy Research Institute, 94; Macaulay Institute for Soil Research, 97; Edinburgh and East of Scotland College of Agriculture, 101; North of Scotland College of Agriculture, 104; West of Scotland Agricultural College, 107; Royal (Dick) Veterinary College, 112.
Agricultural Statistics, 161.
Alexander, J. W., M.V.O., Convener of Science Committee: Report submitted of work done in Chemical Department during first five months of 1946, 205.
Analyses for Members during the first five months of 1946, by Marshall J. Robb, B.Sc., F.R.I.C., and John E. Ritchie, M.A., B.Sc., F.R.I.C., Aberdeen, 125.
Animal Diseases Research Association: Grant of £200; (1946) Confirmed, 185; Approved, 203; (1947) Recommended, 201.
Arbiters, Panel of: Two names submitted to D.O.A.S., 191.
Argyll Naval Fund: Accounts, 182; Submitted, 206.
Attested Cattle at Shows: Recommendations of Special Committee adopted, 186; Report by Chairman to General Meeting, 205.
Baillie, Major C. W. H., Manderston, Duns: Offer of Silver Challenge Cup for best Hunter, accepted, 186, 204.
Barley, Prices of, for 1945, 168; Market for, 194; Reply of Minister of Food to letters from Society, 196, 200; Report by Chairman, 208.
Board Meetings, Proceedings at, 185-201.
Boars, Licensing of: Report by Chairman to General Meeting, 204.
Botanical Department, Appendix, 59.
Bulls, Licensing of: Additional names submitted to D.O.A.S. for Panel of Referees under Improvement of Livestock Act of 1931, 186.
Caithness, The Earl of, C.B.E., Death of, 198.
Cameron, A. E., M.A., D.Sc., F.R.S.E.: Insect and other Pests of 1946, 65.
Cameron of Lochiel, Sir Donald W., K.T.: Re-elected President of the Society, 202; Apology from, 205.
Campbell, Ian M., Bal Blair, Invershin: Resignation from Convenership of Shows Committee, 187.
Campbell of Succoth, Sir George I., Bt.: Forestry: Yesterday, To-day, and To-morrow, 43.
Cereal and other Crops of Scotland for 1946, 127.
Chairman of Board: Mr James R. Lumsden of Arden, re-elected, 188.
Chemical Department, Appendix, 52.
Chemist, Consulting: Decision to be brought up for reconsideration, 185; Decision not to appoint, confirmed by majority of 21 votes to 14, 188-189; Report by Chairman to General Meeting, 205.
Committees for 1946-47, Appendix, 9.
Compensation Values: Table showing the value per ton of Feeding-stuffs as Manure, &c., Appendix, 55.
Convener of Shows Committee: Resignation of Mr Ian M. Campbell, Bal Blair; Captain Ian S. Robertson, Linkwood, Elgin, appointed, 187.
Cottages and Gardens: Premiums offered in 1947, Appendix, 82.
Crops of Scotland, Cereal and other, for 1946, 127.
Dairy Department: Regulations and Syllabus of Examination, Appendix, 39.
Dairy Examination for 1947, Date of, Appendix, 16, 32.
Deaths of—
Caithness, The Earl of, C.B.E., 198.
Henderson, J. Milne, C.A., Edinburgh, 188.
Leven and Melville, The Earl of, K.T., 197.

Deaths of—(continued)—

MacDougall, Dr R. Stewart, Edinburgh, 199.

MacKelvie, Donald, Arran, 199.

Meiklem, William, Kirkcaldy, 185.

Paton, James, C.B.E., Kirkness, 198.

Sprot, Major Mark, of Riddell, 195.

Turnbull, Phipps O., Dunbar, 198.

Walker, Colonel Robert W., Aberdeen, 198.

Whyte, Archibald, Spott, Kirriemuir, 187.

Directors for 1946-47, Appendix, 6.

Directors: Representatives on other Bodies, Appendix, 13.

District Competitions: Awards in 1946, 177; Premiums offered in 1947, Appendix, 67.

District Grants, Appendix, 65.

Double Summer Time: Protest against, to be forwarded to Home Secretary and the Secretary of State for Scotland, 201.

Douglas, J. B., C.B.E.: Tuberculosis Eradication, 59.

Duthie Prize: Regulations for, 194.

Economic Aspects of Farm Mechanisation, by D. Witney, B.Com., and H. Christine M'Iver, B.Sc., 1.

Edinburgh Corn Market, Grain Tables for 1946, 168.

Elgin and Kincardine, The Earl of, K.T., C.M.G., presided at Anniversary General Meeting, January 1947, 205.

Entomological Department, Appendix, 58.

Essays and Reports, Appendix, 61.

Establishment for 1946-47, Appendix, 6.

Examinations, Dates of, Appendix, 16, 19, 32.

Farm Mechanisation: Economic Aspects of, by D. Witney, B.Com., and H. Christine M'Iver, B.Sc., 1.

Feeding-stuffs, Prices of, 1947, Appendix, 53; Table showing the value per ton of, as Manure, Appendix, 55.

Fertilisers, Prices of, season 1947, Appendix, 52.

Finance: Proceedings in regard to, 187, 191, 194, 195, 201; Report to General Meeting, 206.

Food Supplies: Conference on, called by R.A.S.E., attended by Chairman and Sir Joshua Ross-Taylor; Chairman to represent the Society at further conference, 200.

Forestry: Certificates in (discontinued), Appendix, 51.

Forestry: Yesterday, To-day, and To-morrow, by Sir George I. Campbell of Succoth, Bt., 43.

Funds, State of the, 178.

General Meetings, Proceedings at, 202-208.

Glasgow, Agricultural Exhibition in Kelvin Hall: Representatives attended meeting; date fixed for 16th to 26th October; Society agreed to guarantee £1000, 204.

Glasgow and West of Scotland S.P.C.A.: Grant of £10, 201; approved, 203.

Glasgow Veterinary College: Grant of £150; (1946) Confirmed, 185; Approved, 203; (1947) Recommended, 201; Medals awarded, 1946, 176.

Grain, Prices of, for 1946, in Edinburgh Corn Market, 168.

Grants to Local Societies, 207.

Grass Sickness in Horses: Secretary to inform the Animal Diseases Research Association of the Directors' concern about the incidence of the disease, 185.

Harwood, W. A., D.Sc.: The Weather of Scotland in 1946, 150.

Henderson, J. Milne, C.A., Edinburgh, Death of, 188.

Highland and Agricultural Society: Proceedings, 185; Constitution, Appendix, 3; Privileges of members, Appendix, 4; Establishment, Appendix, 6; Meetings, Appendix, 15.

Highland Reel and Strathspey Society, Edinburgh: Grant of £75 recommended, 201; Approved, 203.

Hill Sheep Subsidy: J. W. Alexander, M.V.O., and Captain James Craig, appointed representatives at joint meeting, 192; Report of meeting, 195.

Hobson, George, Cup: Accepted from the Scottish Friesian Breeders' Club for competition at the Highland Society's Annual Show, 201.

Hoeing Competitions, Regulations for, Appendix, 85.

Home, The Earl of, K.T.: Resigns office of Treasurer, 188, 205; Thanks to Directors for message of appreciation, 192; Elected an Honorary Member, 201.

Hunter, Silver Challenge Cup for best: Accepted from Major C. W. H. Baillie, Manderston, 186.

Implements, Spare parts for Agricultural: Department of Agriculture requested to improve supply, 196-197; Reply from Department, 200.

Insect and other Pests of 1946, by A. E. Cameron, M.A., D.Sc., F.R.S.E., 65.

Inverness Show: Special Committee reported on prospects for holding a Show (in 1947); Report and actions of Committee approved, 189; Proceedings in regard to, 190, 192-193; Report of Special Committee, 192-193; Report on efforts to obtain supply of timber, 196; Report by Chairman to Anniversary General Meeting, 206.

- Kilpatrick Trophy, James: Amount of fund raised, 187; Report by Chairman, 204.
- Leven and Melville, The Earl of, K.T., Death of, 197.
- Livestock, Improvement of, Act, 1931 (Licensing of Bulls): Additional names submitted to D.O.A.S. for Panel of Referees, 186.
- Local Societies, Grants to, 1946, 177, 207.
- Lochiel, *see* Cameron of Lochiel (President).
- Long Farm Service: Applicants for Gold Medals to be offered solid silver gilt and enamel medals owing to gold being at present unobtainable, 187; Certificates and Medals: Regulations, Appendix, 85; Awards in 1946, Appendix, 88.
- Loveday Report on Higher Agricultural Education: Memorandum drawn up by the Society with reference to; Representatives invited by the Minister of Agriculture from the R.A.S.E. and the Highland Society to state their case before him, 186-187; Report, by Sir Joshua Ross-Taylor, on the Report, 203.
- Lumaden: Mr James R., of Arden, re-elected Chairman of Board of Directors for 1946-47, 188.
- MacDougall, Dr R. Stewart, Edinburgh, Death of, 199.
- M'Iver, H. Christine, B.Sc., and D. Witney, B.Com.: Economic Aspects of Farm Mechanisation, 1.
- MacKelvie, Donald, Arran, Death of, 199.
- Manderston Cup: Silver Challenge Cup for best Hunter at Society's Annual Show, accepted from Major C. W. H. Baillie, Manderston, Duns, 186; Report by Chairman, 204.
- Manure, Table showing the value per ton of Feeding-stuffs as, Appendix, 53.
- Manures and Feeding-stuffs: Schedule of unit values to continue to be issued, 197.
- Manures, Instructions for Valuing, Appendix, 53.
- Master of Works: Alfred E. Wilson, North Berwick, appointed, 189.
- Mechanisation, Economic Aspects of Farm, by D. Witney, B.Com., and H. Christine M'Iver, B.Sc., 1.
- Medals, Ploughing, Regulations for, Appendix, 85.
- Meetings, Proceedings at Board and General, 185-208.
- Meetings, Regulations regarding, Appendix, 15.
- Meiklem, William, Kirkcaldy, Death of, 185.
- Members admitted since publication of list in April 1946, Appendix, 91.
- Members, Analyses for, during the first five months of 1946, by Marshall J. Robb, B.Sc., F.R.I.C., and John E. Ritchie, M.A., B.Sc., F.R.I.C., 125.
- Members, Privileges of, Appendix, 4.
- Membership: The Chairman of Directors reported on numbers on the list of members, 205.
- Milk Records, by James A. Paterson, 114.
- National Diploma in Agriculture: Reports on Examinations, 203, 207; Regulations and Syllabus, Appendix, 17; Successful Candidates in 1946, Appendix, 25.
- National Diploma in Dairy Husbandry (N.D.D.H.): Regulations for examination in 1948, Appendix, 39; Syllabus of subjects of Examination, Appendix, 43.
- National Diploma in Dairying: Education Committee given powers to adjust and approve Regulations and Syllabus for new National Diplomas in Dairy Husbandry and Dairy Technology, 186; Report by Sir Joshua Ross-Taylor on proposed changes in Regulations and Syllabus, 204; Reports on Examination, 203, 208; Regulations and Syllabus, Appendix, 29; Successful Candidates in 1946, Appendix, 37.
- National Diploma in Dairy Technology (N.D.D.T.): Regulations for Examinations in 1948, Appendix, 39; Syllabus of subjects of Examination, Appendix, 47.
- New Members, 202, 203; Appendix, 91.
- Oats, Prices of, for 1946, 168.
- Office-bearers, 1946-47, Election of, 202.
- Panel of Arbiters: Two names submitted to D.O.A.S., 191.
- Paterson, James A.: Milk Records, 114.
- Paton, James, C.B.E., Kirkness, Death of, 198.
- Pests, Insect and other, of 1946, by A. E. Cameron, M.A., D.Sc., F.R.S.E., 65.
- Ploughing Competitions, Regulations for, Appendix, 85.
- Potatoes, Inspection of Growing Crops of: Reports of Conference submitted by Mr W. D. Simpson, 199; Chairman's Report, 204; Letter from D.O.A.S. on prevalence of "leaf-roll," 190, 204.
- Potatoes, Seed: Letter from D.O.A.S. re Inspection of consignments, 191.
- Premiums awarded in 1946, 176; Offered in 1947, Appendix, 61.
- Prices of Grain for 1946, 168.
- Prices of Sheep, 169.
- Prices of Wool, 173.
- Privileges of Members, Appendix, 4.

- Proceedings at Board Meetings, 185-201.
 Proceedings at General Meetings, 202-208.
 Rainfall Records for 1946, 160.
 Receipts and Payments for 1945-46, 184.
 Records, Milk, by James A. Paterson, 114.
 Red Cross Agriculture Fund, *see* Scottish Red Cross Agriculture Fund.
 Referees, Panel of, *see* Livestock, Improvement of, Act, 1931 (Licensing of Bulls).
 Representatives appointed on other Bodies, Appendix, 13.
 Research in Scotland, Agricultural, in 1946, 89-113.
 Ritchie, John E., M.A., B.Sc., F.R.I.C., and Marshall J. Robb, B.Sc., F.R.I.C.: Analyses for Members during the first five months of 1946, 125.
 Robb, Marshall J., B.Sc., F.R.I.C., and John E. Ritchie, M.A., B.Sc., F.R.I.C.: Analyses for Members during the first five months of 1946, 125.
 Robertson, Captain Ian S., Linkwood, Elgin: Appointed Convener of Shows Committee, 187.
 Ross-Taylor, Sir Joshua: Nominated to succeed the Earl of Home, K.T., as Treasurer, 194; Elected, 205.
 Royal Scottish Agricultural Benevolent Institution: Grant of £100, 201; Approved, 206; Support of Appeal for Special Jubilee Fund, 197; Grant of £250 recommended, 201.
 Science: Reports by Chemist, 125.
 Scotland, Agricultural Research in, in 1946, 89-113.
 Scotland, Cereal and other Crops of, for 1946, 127.
 Scottish Agricultural Organisation Society: Grant of £100 recommended, 194; Confirmed, 195; Approved, 206.
 Scottish Friesian Breeders: George Hobson Cup accepted by Highland Society for competition at Annual Show, 201.
 Scottish Red Cross Agriculture Fund: Major R. F. Brebner, C.B.E., reported closing of Fund, 204; Mr James Paton, C.B.E., reported final results, 207; Grant made of expenses, 206.
 Scottish Society for the Prevention of Cruelty to Animals: Grant of £10 approved, 206.
 Sheep, Prices of, 169.
 Shows Committee, Convener of: Captain Ian S. Robertson appointed, 187.
 Showyard Erector: Increase of salary, 191.
 Simpson, W. D., Highfield, North Berwick: Report on Conference on Inspection of Growing Crops of Potatoes, 199.
 Sprot, Major Mark, of Riddell: Resolution on death of, 195.
 State of the Funds, 178.
 Statistics, Agricultural, 161.
 Treasurer: The Earl of Home, K.T., resigns office, 188; Nomination of Sir Joshua Ross-Taylor as successor, 194; election, 205.
 Tuberculosis Eradication, by J. B. Douglas, C.B.E., 59.
 Tuberculosis, Eradication of: Letter and Memorandum from Ministry of Agriculture, 190; Minute of Science Committee, 193; Reports of Meetings at St Andrew's House, 200.
 Turnbull, Phipps O., Dunbar, Death of, 198.
 Unit Values of Manures and Feeding-stuffs: Schedule to continue to be issued, 197.
 Veterinary College, Glasgow: Medals awarded, 1946, 176.
 Veterinary College, Royal (Dick): Medals awarded, 1946, 176.
 Veterinary Department: Medals, Appendix, 51.
 View of Receipts and Payments, 1945-46, 184.
 Walker, Colonel Robert W., Aberdeen, Death of, 198.
 Watt, John, Second Clerk: Resignation of post; Honorarium to, 195.
 Weather of Scotland in 1946, by W. A. Harwood, D.Sc., 150.
 Wheat, Prices of, for 1946, 168.
 Whyte, Archibald, Spott, Kirriemuir, Death of, 187.
 Wilson, Alfred E., North Berwick: Appointed Master of Works, 189.
 Witney, D., B.Com., and H. Christine M'Iver, B.Sc.: Economic Aspects of Farm Mechanisation, 1.
 Wool Marketing, Post-War: Captain James Craig reported on negotiations with other bodies, 191; Report by Chairman, 204.
 Wool, Prices of, 173.

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